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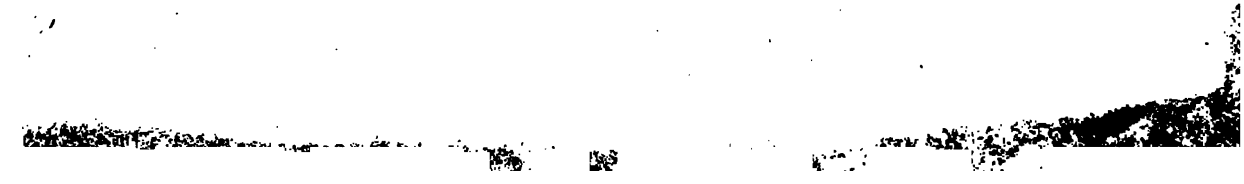

THE

SCHOOL EXERCISE.

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SCHOOL EXERCISE;

CONTAINING

A COURSE OF LESSONS,

IN WHICH

THE VARIOUS BRANCHES OF EDUCATION

ARE INTRODUCED AS

SUBJECTS FOR READING

IN

SCHOOLS.

BY CHARLES MEAD.

A thorough knowledge of the theory renders the practice easy and familiar.

SECOND EDITION, REVISED, ENLARGED AND IMPROVED.

PHILADELPHIA:

PUBLISHED BY JAMES E. MOORE,
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1823.

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EASTERN DISTRICT OF PENNSYLVANIA, to wit:

BE IT REMEMBERED, that on the 4th day of January, in the forty-fourth year of the Independence of the United States of America, A. D. 1820, CHARLES MEAD, of the said district, hath deposited in this office the title of a book, the right whereof he claims as author, in the words following, to wit:

"The School Exercise, containing a Course of Lessons, in which the various branches of Education are introduced as subjects for reading in Schools. By CHARLES MEAD. A thorough knowledge of the theory renders the practice easy and familiar"

In conformity to the Act of the Congress of the United States entitled, "An act for the encouragement of learning, by securing the copies of maps, charts, and books to the authors and proprietors of such copies during the times therein mentioned." And also to the act, entitled, "An act supplementary to an act entitled, "An act for the encouragement of learning, by securing the copies of maps, charts, and books, to the authors and proprietors of such copies during the times therein mentioned, and extending the benefits thereof to the arts of designing, engraving, and etching historical and other prints.

DAVID CALDWELL,
Clerk of the Eastern District of Pennsylvania.

INTRODUCTION.

CONSIDERING the education of youth as the source from which every community receives, in a great measure, its social organization; and viewing it as the primary object in promoting the happiness and prosperity of every nation, an attempt to assist the rising generation in the acquisition of useful knowledge, may at least be considered as an effort produced from laudable intentions. How far I have succeeded in this attempt, with the book now under consideration, public opinion must determine.

Notwithstanding the number of valuable school books already in use, it is the opinion of competent judges, to whom the plan of the following one has been submitted, that a class book calculated to give a compendious view of all the most important and useful branches of education, would prove serviceable to youth.—That serving as a scientific expositor, it would tend to facilitate the progress of the learner, in acquiring a knowledge of the rudiments of what constitute a good education, while performing his usual lessons in reading at school; and afford more solid information than could be acquired from the reading of narrative and miscellaneous pieces.

The plan embraced in the present work is somewhat different from that of any preceding publication. Its arrangement is the result of deliberation, and the concurring opinion of others, respecting the utility of the design, together with the very favourable reception of the first edition, gives me full confidence in the belief, that those persons generally, who are engaged in the instruction of youth will at least give it a fair trial.

In preparing the SCHOOL EXERCISE, I have no great claims to originality of composition; it is chiefly a selec-

*A B S
MAY 5. 1938

tion. And to those authors whose respective systems have stood the test of trial and experience I am indebted for materials. I have, however, found it necessary to condense those materials, and to present many articles different from the original ones; and have thought proper to introduce several subjects with my own observations.

In presenting a school book to the public, the author may expect its merits or demerits to be determined in a great measure by candid and intelligent teachers. They are the best judges of what comes within the sphere of their laudable and important avocations.

Booksellers have a powerful influence in giving either a favourable or unfavourable character to every new publication. But the influence of those who are engaged in the traffic of books, is seldom exercised in any other way than as interest may dictate. Consequently they cannot be expected to act, as the impartial arbiters of public opinion, in regard to the merits of any publication. The approbation of booksellers is, however, generally desired by authors. But as it relates to myself, I am neither very solicitous of the favours, nor fearful of the displeasure of those who would either recommend or condemn a book, merely to gratify a sordid rapacity for gain: without any regard whatever, for the advantages or disadvantages, that it might be to the community in general.

The present is an age in which the people of this country have witnessed many improvements in the organization and management of the institutions for the diffusion of useful knowledge. An honourable zeal to bring forth, and cultivate the faculties of the human mind, is manifest by those who guide the concerns of our national and state governments: and no imposing restrictions prevent any individual in the community, from acquiring all the information that his situation, capacity and circumstances will admit. If we allow the correctness of the generally received maxim, that 'knowledge is

power,' this power, whether nationally or individually, owes its origin to a proper education of youth.

The noblest prerogatives of man are his intellectual faculties. These faculties raise and exalt his character in proportion as they are cultivated and improved. Aided by art and education, he seems to rise with dignity, above the sphere in which nature has placed him. He is able to converse with his fellow beings in a language in which words and sentiments are expressed only by visible marks. Every branch of education may develop new energies of his mind, and give additional importance to his existence. Those branches acquired in our common schools, are the most essential as they are more applied to the various transactions of life. Other branches, while they instruct and elevate the mind, lead also to a reverence and adoration of the author of all things, by opening to our view the wonders of creation. Man is naturally an inquisitive and inquiring being; and in the pursuits of science, truths are exhibited to gratify his inquiries. A knowledge of geography enables him to view the world in miniature, and to trace, at his leisure, all the most interesting features on the face of our globe. Guided by astronomy, he lifts his imagination to the firmament, and marks with precision the revolutions of the heavenly bodies. From the study of botany, mineralogy, mathematics, history and philosophy, he replenishes his mind with a fund of intellectual treasures from which he can give to society without diminishing his own stock of mental possessions.

While in many other countries, through the tyranny and depravity of the one sex, the means of instruction are withheld from the other, it is for us a pleasing reflection that in the United States, society often derives its brightest ornament from female education; and the youthful mind often receives from the lips of an intelligent mother those indelible impressions of instruction which lead to a life of usefulness, honour and virtue. And it is presumed that the utility of the present production will not be exclusively confined to schools nor to either sex.

As the most valuable inheritance which human beings receive through the will of Deity, are the faculties of speech and reason; the cultivation and improvement of these faculties are objects of the highest importance. And to those whose pursuits are devoted to these purposes, and to the public in general, I with deference submit the following work.

THE AUTHOR.

Philadelphia, 1828.

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RECOMMENDATIONS.

Copy of a note received from Wm. Staughton, D. D.
Philadelphia, July 31, 1821.

I have perused "the School Exercise of Mr. Mead." The plan is excellently adapted for class-reading. It contains a mass of information, which is capable of being introduced to the attention of pupils, according to the principles upon which the book is formed, with little trouble and great advantage. I think Mr. M. entitled to the thanks of the public for this literary effort, and hope ample encouragement will attend its publication.

WILLIAM STAUGHTON.

Extract of a letter from gov. Clinton to Joseph Delaplaine, Esq. dated Albany, March 4th, 1822.

I have just looked into Mr. Mead's book, and think it a judicious selection, well calculated to promote its laudable object.

I am, with great esteem, your
most. obt. svt.

DE WITT CLINTON.

The following is a copy of a note received from James Abercrombie, D. D.

SIR,

I have perused, with much pleasure, Mr. Mead's late work, entitled "School Exercise." The wide range of science which it embraces, necessarily requires *brevity* on all the subjects introduced, and Mr. Mead has with very great judgment condensed the most prominent and useful principles, of every Art and Science which he has presented to the reader's attention, in correct, easy, and familiar language.

It is, I think, a work extremely well calculated to convey much useful information to the juvenile mind.

JAMES ABERCROMBIE.

MR. J. MAXWELL.

Copy of a note received from Wm. Darby, author of the History of Louisiana, the Emigrant's Guide, &c. &c.

Philadelphia, July 6th, 1821.

DEAR SIR,

I have given your School Exercise as close an examination as my time would admit, and am free to say that, in substance and arrangement, as far as I am capable of forming an opinion, the work appears well calculated to form a valuable addition to our stock of school books.

I sincerely hope that your public patronage may be as ample, as I believe your treatise entitles you to ex-

pect. Accept, dear Sir, the sentiments of my sincere esteem.

WILLIAM DARBY.

MR. CHARLES MEAD.

The following is a copy of a note received from Samuel B. Wylie, D. D. Classical Teacher in Philadelphia.

DEAR SIR,

I have perused your Book, entitled "School Exercise," and have no hesitation to say, that in my opinion it contains an excellent selection of useful materials, not only for assisting the young student in reading, but also for familiarizing his tender mind with an extensive vocabulary of general knowledge. As a school book, it will form a valuable addition to the elementary works of a similar kind, already extant; while in some respects, its merits exceed any which have heretofore come under my notice Most cordially do I wish you success in your undertaking, and an adequate remuneration for your labour in its compilation.

Yours, &c.

SAMUEL B. WYLIE.

MR. CHARLES MEAD.

Philadelphia, July, 1821.

SIR,

I have examined in a very cursory manner, the "School Exercise" which you were so obliging as to put into my

hands for inspection; it appears to me to be well adapted to quicken the apprehension, and excite new ideas in the minds of young persons, to qualify them for relishing with greater delight the society and conversation of men of letters, and persons of more mature years; and perhaps be instrumental at a more advanced period of life, of stimulating them to pursue with more avidity, patience, and perseverance the wide field of human knowledge, which the present volume partially but perspicuously opens to their view—with the best wishes for the encouragement of the work, and that the author may be liberally compensated for the trouble bestowed on the arrangement and composition of it, and in a degree commensurate with his expectations, permit me to subscribe myself,

Your most obedient Friend,

ROBERT ANDREWS.

MR. J. MAXWELL.

Philadelphia, July 15th. 1821.

SIR,

I have read your volume entitled "The School Exercise," and concur in the opinion, that it may become a valuable acquisition to our seminaries; not merely as a reading book, but as a book calculated to give first ideas to the young student, of the great variety of subjects contained in it, as well as by its peculiar arrangement, to in-

duce the habit of reflection, which is generally considered as an important desideratum.

I highly approve the division of the chapters into short sections, which is found by long experience to be the most convenient, particularly in class reading.

Wishing you success proportionate to your laudable endeavours, to add to the general stock of juvenile improvement,

I am, with the greatest respect,

Your obt. svt.

B. MAYO.

MR. CHARLES MEAD.

Philadelphia, July 11th, 1821.

SIR,

I have perused the "School Exercise" and believe the judicious selection and novel arrangement of matter cannot fail to render it a popular and useful book for schools.

Very respectfully,

Sir,

yours,

GEO. DENISON.

MR. MEAD.

Philadelphia, July 10th, 1821.

DEAR SIR,

I have examined by your request, the book you are about to publish, entitled "School Exercise," and with pleasure offer you my recommendation of it; believing that both the matter it contains, and the manner in which it is presented, will render it very useful to those engaged in the business of education, and worthy of public encouragement.

Yours, respectfully,

JOHN SANDERSON.

MR. MEAD.

Extract of a letter received from Saml. L. Mitchell, M. D. L. L. D. dated New York, August 17th, 1821.

SIR,

I have read your book entitled "School Exercise," and as far as I can judge from the short time allowed me to examine and consider, the topics you have selected are interesting, and are treated in an intelligent and instructive manner.

Your work ought, from its merit, to recommend itself, or if favourable opinions were necessary to render it popular and welcome, you have already certificates enough from high authorities to induce the teachers of youth generally to examine it. It will always afford me pleasure to learn that the work is extensively useful.

The instructors of the rising race are engaged in a important function; one that is too lowly estimated. Tha their labours may be duly appreciated and encouraged and that they may prove themselves worthy of increase consideration is the wish of your friend,

SAMUEL L. MITCHELL.

MR. CHARLES MEAD.

Philadelphia, July 12th, 182

SIR,

I have perused your work, entitled, "Schoo Exercise," with great attention, and find it to be a mos excellent epitome of the Arts and Sciences. Being clearl and methodically arranged, it will impart to the Juvenil Student a *fund* of instruction; which, treasuring in hi mind, he will be able to draw from, at a more advance period of life, with profit and delight.

I hope it will become extensively diffused amon our seminaries, and remunerate you for the trouble yo have experienced in its arrangement.

I remain,

Sir,

Yours, obediently,

C. W. BAZELEY.

Extract from a letter received by Joseph Delaplaine, Esq. from the Hon. James Madison, dated Montpelier, Feb. 12th, 1822.

DEAR SIR,

I have received your letter of January 22nd, and with it the volume of Mr. Mead, entitled "School Exercise."

A plan which brings into a small compass the several branches of youthful instruction, which places them in the proper order of succession, and conducts the student by easy gradations in each, from an early to an advanced stage of education, speaks sufficiently its own commendation.

That this merit is due to Mr. Mead I readily admit, on the sanction given to it, by those who must be well qualified to form a just estimate.

With friendly respects,

JAMES MADISON.

THE ALPHABET.

THE most important of all human inventions may be reckoned that of the alphabet. Its origin, though somewhat doubtful, is attributed to the genius of Memnon, an Egyptian, who existed eighteen hundred years before the christian era.

2. Nothing has ever had so great an influence in promoting civilization, and diffusing social happiness amongst mankind, as the use and application of those signs, or characters, by which the language of the tongue is presented to the eye, and the various conceptions of the human mind are exhibited in a visible form.

3. Letters have opened to man the fields of science, in which he may contemplate the productions of art or investigate the laws of nature. They constitute his only sure guide in the pursuit of knowledge, and it is by them that the discoveries and improvements of former times, together with the oracles of revelation are faithfully transmitted from age to age.

4. During the dark interval between the creation of the world and the invention of letters; while memory and tradition were the precarious basis of history, human efforts were in vain employed to preserve from oblivion an account of those moral and physical events which might have been interesting to succeeding generations. And nothing but Divine intelligence could perpetuate amongst mankind a knowledge of what occurred in those remote periods of antiquity.

5. And to that source of unbounded and unerring wisdom, are we indebted for all we know of what transpired in the early ages of the world. The introduction of

letters has, however, produced a most salutary change in the moral and political concerns of human life; and has superseded the necessity for tradition and divine revelation.

6. When we appeal to the testimonials of history, for information respecting the various nations of the earth, which have existed since the invention of the alphabet; we are only made acquainted with the rise, career, condition and downfal of those states and empires, where letters have been used as the instruments for recording events.

7. And with people long benighted in the gloom of ignorance and barbarism, we may notice the first use of letters amongst them, as the dawning of their civilization. No other artificial means can as well prepare the mind for the reception of knowledge.

8. "Many learned authors have made inquiries into the origin of alphabetical writing; and some of them have attributed the invention to the immediate inspiration of God. It however appears to have been a very simple and direct improvement of the hieroglyphic art.

9. "The alphabets of different nations vary in the number, as well as the forms of their constituent characters. The Hebrew, which may be considered as the original, has twenty-two, and the Chaldee, Syriac and Samaritan, have twenty letters each.

10. "The Arabic has twenty-eight letters, the Persian thirty-one; the Turkish twenty-three: the German twenty-six; the Latin twenty-two; the Greek twenty-four; and the Spanish twenty-seven.

11. "The Tartarian, as well as the Ethiopic, consists of two hundred and two letters; the Chinese, properly speaking, have no alphabet. The words of their language are represented by hieroglyphics, which amount to about eighty thousand." The first alphabet introduced into Europe, as is generally supposed, was brought by Cadmus the Phenician, into Greece, about sixteen hundred years before the birth of Christ: this alphabet contained but sixteen letters.

12. The letters of the English alphabet are twenty-six in number: of which a, e, i, o, u, and y, and sometimes w, are called vowels, and the others consonants: no word in our language can be expressed by letters, without the agency of one or more of the vowels, the sounds of which vary as they are used in different words.

13. A has four different sounds, the long sound as in hail, the short sound as in hat, the middle sound as in star; and the broad sound as in water. E has three sounds, a long sound as in heal, a short sound as in let, and a middle sound as in delight.

14. I has a long sound as in fine, a short sound as in pit, and a middle sound as in live. O has a long sound as in noble, a short sound as in lot, a broad sound as in horn, and a middle sound as in love.

15. U has a long sound as in tube, a short sound as in cup, and a middle sound as in bush. Y has a long sound as in fly, and a short sound as in folly.

16. It may not be improper to observe, that in some words one vowel bears the sound of another. For example: *a* is sometimes sounded like *u* short, as in the word cedar: and *e* has the short sound of *u* as in her. I has the long sound of *e* as in machine, and the short sound of *u*, as in flirt. O has the short sound of *u* as in ton.

17. U is sounded like *i*, in several words; such as busy, business, &c. and in some words it sounds like *e*, as bury. W, when used as a vowel, is sounded like *u*, as in crew, view, &c. Y, when used as a vowel, has exactly the sound of *i*, in the same situation; as in sky, fancy, party, &c.

18. The union of two vowels in one syllable, is called a dipthong; as *ai* in sail, or *eo* in people. When only one of the vowels is sounded, it is called an improper dipthong; as *ea* in eagle. The union of three vowels in one syllable is called a tripthong, as *eau* in beau.

19. Some of the consonants likewise vary in their sounds, as they are differently combined with other letters. B retains its own proper sound in almost every situation;

it is however silent in some words, such as debtor, doubtful and subtle.

20. C, when used before *a*, *o*, *u*, *r*, or *l*, is sounded hard like k, as in cash, corn, cold, crook, clan. It is generally sounded soft like *s*, when used before *e*, *i*, and *y* as in centre, cider and cymbal. Formerly *c* was followed by *k* at the end of words, but latterly the *k* has been rejected as superfluous.

21. Ch, in words derived from the French, is sounded like *sh*; as in chaise, machine, chagrin. D and F have but little variation in their sounds. D. however, may be said to have the sound of *t*, as in the words stuffed, stripped, &c. and *f* in the word *of* has the sound of *v*.

22. G, when used before *e*, *i* and *y* has frequently the sound of *j*: as in gem, giant, &c. It is mute before *n*, as in gnash, reign, foreign. When *gh* is used at the beginning of a word the *g* only is sounded, as in ghost; and at the end of a word it has the sound of *f*, as in laugh.

23. H is always silent after *r*, as in rhyme and rhapsody; and in some instances it is mute after *t*, as in Thomas, and it is also silent at the end of a word when preceded by a vowel, as in Hannah; *j*, has the sound of *y* in hallelujah; but is generally sounded like *g* soft, as in joy, jovial, &c. K is always silent before *n*, as in knife, knob, and knocker.

24. L is silent in a number of words; such as walk, talk, chalk, would, should and could. Words ending in *le* are sounded as if *el* were used; as table, marble, noble. M has but little variation from its natural sound. It, however, takes the sound of *n* in the word comptroller.

25. N is never sounded when it ends a syllable, and is preceded by *m*, as in column and autumn. P is mute in some words; such as psalm, tempt and empty. *Ph* is generally sounded like *f*, as in physic and philosophy; and in the word Stephen it is sounded like *v*.

26. Q is always followed by *u*, and *qu* is sometimes sounded like *k*, as in conquer, burlesque, &c. R varies but little in its sound; *re*, in some words is pronounced

like *er*, as theatre, ochre, and sepulchre. S is sometimes sounded like *z*, as dismal, amuse, and rosy. It is mute in a few words, such as island.

27. T has its natural sound in most words in which it is used. But *ti* before a vowel has frequently the sound of *si*, as in nation, station, salvation. V has one uniform sound.

28. W is mute when used before *r*; as in wring, wreath, write and wrap. When used as a vowel, it has the sound of *u*, as in draw, new, and view.

29. X never begins any words, except such as are derived from the Greek, when it has the sound of *z*, as in Xerxes. In some words it sounds like *ks*, as in flax and perplex. Y, when used as a consonant, keeps its natural sound in almost every situation. Z: this letter ze has a regular and invariable sound, as in zeal, zion, zephyr, &c.

30. When we consider the irregularities which prevail in the sound of our letters, it appears that our alphabet is not, in every instance, reduced to that order which reason and analogy would prescribe. But we probably experienced less inconvenience from its present imperfections, than we should from the innovation and confusion which would be occasioned by any material change, or alteration in our present system of alphabetical writing.

ORTHOGRAPHY.

ORTHOGRAPHY teaches the proper use of letters in spelling words; and shows how words are divided into syllables. As letters are the materials which constitute the written language, a thorough knowledge of their properties, and of the rules for their arrangement in forming syllables, is of the highest importance. Whoever wishes to read and write with propriety, ease and facility, must devote particular attention to the orthography of his language.

1. Since it is, as Mr. Harris observes, "to principles ap-

parently so trivial as a few plain elementary sounds, we owe the variety of articulate voices, which have been sufficient to explain the sentiments of so innumerable a multitude as all the present and past generations of men, no one should neglect as inconsiderable the study of orthography.

2. The words of the English language consists of from one to seven syllables; of which each syllable is a distinct articulation of the human voice.

3. A word of one syllable is called a monosyllable, and is produced by a single impulse of the voice, as *man*. A word of two syllables is a dissyllable, and is produced by two distinct articulations, as *mankind*. A word of three syllables is termed a trysyllable, and is formed by the union of three distinct sounds, as *manliness*. All words of more than three syllables are called polysyllables.

4. It may be observed that some improprieties seem to exist in the orthography of our language, and that men of erudition differ in their opinions, in regard to particular words. But few, however, are inclined to appeal from the decision of Dr. Johnson.

5. Mr. Nares speaking on this subject observes, that "truth and reason are irresistible. Dr. Johnson's Dictionary has nearly fixed the external form of our language. Indeed, so convenient is it to have one acknowledged standard to recur to; so much preferable, in matters of this nature, is a trifling degree of irregularity, to a continual change, and fruitless pursuit at unattainable perfection; that it is earnestly hoped that no author will henceforth, on slight grounds, be tempted to innovate."

6. To assist the learner in making a proper use of letters in spelling words, and in dividing words into syllables, a knowledge of the following rules, which have been received as the basis of English orthography, is necessary.

7. 1. Monosyllables ending with *f*, *l* or *s*, preceded by a single vowel, double the final consonant; as staff, mill, kiss, &c. The only exceptions to this rule are, of, if, is, has, was, yes, his, this, us and thus.

8. II. Monosyllables ending with any consonant but *f*, *l* or *s*, and preceded by a single vowel, never double the final consonant; excepting add, ebb, butt, egg, odd, err, inn and buzz.

9. III Words ending in *y*, preceded by a consonant, are made plural, by changing *y* into *i*, with the addition of *es*, as body, bodies, duty, duties. But when *y* is preceded by a vowel, it is seldom changed; as toy, toys, play, plays.

10. IV Words ending with *y*, preceded by a consonant, upon assuming an additional syllable, beginning with a consonant, commonly change *y* into *i*, as happy, happiness. But when *y* is preceded by a vowel, it is very rarely changed in the additional syllable, as joy, joyful.

11. V. Words ending with a single consonant, preceded by a single vowel, and with the accent on the last syllable, upon assuming an additional syllable, beginning with a vowel, double the consonant, as abet, abettor, begin, beginning, wit, witty, &c. But if a diphthong precedes, or the accent is on the preceding syllable, the consonant remains single; as toil, toiling, offer, offering, maid, maiden, &c.

12. VI. Words ending with any double letters but *l*, and taking *ness*, *less*, *ly*. or *ful* after them, preserve the letter doubled; as, harmlessness, carelessness, successful, &c. But those words which end in double *l*, and take *ness*, *less*, *ly* or *ful* after them, generally omit one *l*, as fulness, skilful, &c.

13. VII. When *ness*, *less*, *ly* and *ful* are added to words ending with silent *e*, the *e* is not dropped: as paleness, graceless, peaceful; except in a few words, as duly, truly, and awful.

14. VIII. *Ment* added to words ending with silent *e*, generally preserve the *e;* as in abatement, chastisement, incitement, &c. The words judgment, abridgment, and acknowledgment are deviations from this rule. Like other terminations *ment* changes *y* into i when preceded by a consonant; as merry, merriment, &c.

15. IX. When *able* and *ible* are added to words ending in silent *e*, the *e* is seldom used; as, blame, blamable, sense, sensible. But if *c* or *g* comes before *e* in the original word, the *e* is then generally preserved in words ending with able; as change, changeable, peace, peaceable, &c.

16 X. When *ing* or *ish* is added to words ending with silent *e*, the *e* is almost always omitted; as place, placing, lodge, lodging, slave, slavish.

17 XI. A single consonant between two vowels, must be joined to the latter syllable: as, de-light, re-tire, prevail: except the letter *x*, as, ex-ist, ex-amine: and except likewise compound words; as up-on, un-even, and disease.

18. XII. Two consonants proper to begin a word must not be separated; as fa-ble, ta-ble ri-fle, &c. But when they come between two vowels, and are such as cannot begin a word, they must be divided; as, ut-most, un-der, in-sect.

19 XIII. When three consonants meet in the middle of a word, if they can begin a word, and the preceding vowel be pronounced long, they are not to be separated; as de-throne, de-stroy. But when the vowel of the preceding syllable is pronounced short, one of the consonants always belongs to that syllable; as dis-tract, dis-prove, dis-trust.

20. XIV. When three or four consonants, which are not proper to begin any word, meet between any two vowels, the first consonant is always kept with the first syllable in the division; as, ab-stain, complete, con-strain.

21. XV Two vowels, not being a diphthong, must be divided in separate syllables; as, cru-el, de-ni-al, and so-ci-e-ty.

22. Some of the preceding rules may be liable to considerable exceptions; and therefore it is said by Dr. Lowth and others, that the best and easiest method for dividing syllables in spelling, is to divide them as they are gene-

rally separated in a right pronunciation, without any regard to the derivation of words.

READING.

Amongst all people distinguished for their refinements and civilization, the most prevalent and important art is that of reading. The improvement of the mind, the cultivation of taste, and the acquisition of knowledge are the advantages derived from this art.

2. From reading we are made acquainted with the passing events and occurrences in various parts of the world, and are enabled to repeat the sentiments of those who have existed in former times.

3. It brings to view the scenes of departed years, and exhibits the rise and fall and the revolutions of the ancient communities of mankind; and offers to our reflection all the most important circumstances connected with the improvement of human society.

4. Reading may be considered as the key which commands our entrance and gives us access to the various departments of science and literature. It enlarges the sphere of observation, and affords abundant materials for exercising the faculties of the mind.

5. As it has a great influence in guiding the opinions and sentiments of young persons, it is of considerable importance that they read books in which things are represented in their true colours; that they properly discriminate between romance and reality; and that they reflect upon the substance of what they read, and draw suitable inferences from the same.

6. On the subject of reading, it is difficult, in every instance, to give precise and definite rules. To deliver the written language with ease and propriety, much depends on a judicious management of the voice in regulating the utterance agreeable to the nature of the discourse.

7. In reading, as in music, particular regard should paid to the order of time. Without a due observance the various pauses required between words and sentenc a reader can give but little harmony to his articulati nor expression to the sentiments he utters.

8. The pauses to be observed in reading, are mark by the following characters, viz: the comma (,) which used to denote the shortest pause, requires that the rea should stop till he can speak a word of one syllable. T semicolon (;) requires a pause twice as long as the co ma. The colon (:) is used to represent a pause thi times as long as the comma, or till the reader can cou three.

9. The period (.) is placed at the end of a senten and requires that he should stop till he can pronounce word of four syllables. The exclamation point (!) is us when we express some sudden emotion of the mind, a requires a pause generally as long, and sometimes lon than the period.

10. An interrogation point (?) is used at the end o sentence, when a question is asked, and requires nea the same suspension of the voice as the period.

11. The foregoing characters serve to mark the int vals or suspensions of the voice, to be observed in readi But the precise order of time is governed in a great me sure by the nature of the subject. Some sentences quire a more rapid succession of words than others; a consequently the pauses which occur should be shor than those to be observed when the composition requi a slower and more deliberate method of delivery.

12. To give a full and clear expression to every se tence in reading, it is necessary that the terms empha and cadence should be well understood, and properly a plied.

13. The former signifies a certain stress of voice w which we pronounce a particular word or words, in or to represent more precisely their meaning. And the l ter signifies a depression or lowering of the voice in c

articulation. In addition to the foregoing, particular attention should be paid to the accented syllable.

14. "Reading may be divided into six kinds, viz: intelligible, correct, impressive, rhetoric, dramatic, and epic; each of which requires a particular manner or method of delivery.

15. The lowest degree of reading aloud for the information of others, which can be admitted as useful to the public, is that which is named *intelligible* reading.

16. To a reader of this class, the following are the only requisites; good articulation, proper attention to pauses and accent, and sufficient efforts of voice to render himself audible to all concerned.

17. To articulation, pauses, and accents, and efforts of the voice, necessary to render a reader fully intelligible, the *correct* reader must add something more: the additional requisites for him are emphasis, purity of pronunciation, and a suitable demeanor.

18. The correct reader must evince his own just conceptions of what he reads, by applying proper emphasis, which serve as touches of light in a picture, to bring forward the principal objects. He must study purity of pronunciation, that he may not offend or distract the attention of his hearers, by diverting it from the subject and turning it upon himself.

19. Upon this principle it is necessary that he be most careful not to offend by affectation; which, even in a greater degree than rustic vulgarity itself, disturbs the attention from the proper objects of public speaking, persuasion and instruction.

20. In addition to the requisites necessary to the *correct* reader, the impressive reader must possess the following: expressions of the voice, expression of the countenance, direction of the eye, variety of manner as to rapidity of delivery and rhetorical pauses.

21. Hence impressive reading comprehends two entire divisions in the art of delivery, the modulation of the voice and expression of the countenance; of gesture it

partakes but little, and that little is very different from what is proper for oratory.

22. If to the impressive style of reading be added such a degree of acquaintance with the subject, as that it shall be nearly committed to memory, and that it be accompanied with gestures to a certain degree, and more decided expression of the eye and countenance, it constitutes a more forcible style, which may be termed *rhetorical* reading.

23. This style of reading is adapted to popular discourses from the pulpit, which if intended to be delivered, should be composed in all the form of a regular oration. Because as one subject of a discourse requires a different style of composition, it requires also a different manner of reading.

24. *Correct* reading suits a discourse on evidences; *impressive* reading on exhortation; and *rhetorical* reading, those subjects which call forth higher exertions of pulpit eloquence; as funeral orations, great public occasions; the solicitation of alms for useful charities, and in all discourses where the orator has to excite passion and emotion.

25 To read well should be esteemed a very high attainment in public speaking; and no labour should be thought too arduous for its acquirement, by those who are likely to be called upon in any situation to read in public.

26. Reading in private is seldom carried farther than that description called impressive. But in the reading of a play, when one person goes through the whole drama, a manner is almost necessarily adopted which is called *dramatic* reading.

27. In this style of reading, the voice, the countenance, and the delivery as to rapidity or slowness, force or feebleness, are nearly suited to the character which it is supposed at any time to speak; and even provincial and foreign accents are also, in some degree, imitated.

28. History, which is the most improving subject of

private reading, in its mere narrative parts, requires no greater efforts on the part of the reader, than the style which is termed *correct*.

29. But in lively descriptions of places, situations, and great actions, *impressive* reading is altogether necessary, and in the speeches which sometimes occur, rhetorical reading should, in some measure, be introduced.

30. The same circumstances occur more frequently, and are more heightened in epic poetry; and, therefore, as well on account of the lofty measure and elevated language, an epic poem requires of the reader a more dignified and exalted strain, and manner almost constantly above the ordinary level.

31. Descriptions, which in poetry abound, are more highly ornamented than the mere interesting history; similies and other poetical figures are introduced in all their grandeur and beauty; battles are described with most terrible and striking precision, and speeches are delivered with all the ornament, and all the powers of eloquence.

32. Thus every thing sublime and beautiful, awful and pathetic, being assembled in an epic poem, as in a tragedy, the reader must be all awake, if he would deliver either with just effect; he must be filled with his subject, governed by taste and judgment, alive to feeling, and inspired, like the poet himself, with a degree of enthusiasm."*

WRITING.

WRITING is that art which enables us to express our ideas by letters. It may be considered as the parent of numberless improvements, and as one of the highest ornaments of social life.

* Chapman's Orator.

2. It affords us the means of preserving the fruits of our mental investigations; and has presented us with innumerable lessons of instructions from the ancient narrations of history.

3. To enumerate all the advantages derived from alphabetical writing, would be to range a boundless field of observation, and to trace progress of improvements from the first use of letters to the present period.

4. The benefits conferred on mankind by this art cannot be too highly appreciated; since from the simple process of writing, we can give a faithful representation of our thoughts and sentiments, which we can wrap up and transmit to other parts of the world: and by this kind of communication keep up a social intercourse with our most distant friends.

5. "The history of the origin and progress of alphabetical writing, is less enveloped in obscurity than that of oral language. Difficulties attend it in common with every other inquiry into antiquity; but the data are more numerous and progressive than the fleeting nature of audible sounds would admit.

6. "The rudiments of the art of writing are very simple. Its advancement to its present state of improvement slow and gradual. Visible language first used marks as the signs of things; and we can trace it through all its stages from the simple picture to the arbitrary letters, for the elements of sound.

7. "The writing of antiquity was a species of engraving Pillars and tables of stone were first employed for this purpose, and afterwards plates of the softer metals, such as lead; or tables of wax, or skins of parchment. A polished point of iron called the *stylus* was used to scratch letters on the wax; but the writing on parchment was performed with pen and ink."

8. In noticing the various methods of writing which have prevailed in different nations, we find that it has been customary for some people to begin their lines at the right hand side of the page and write towards the left.

9. Others have extended their lines from the top to the bottom in a perpendicular manner. The former was the method pursued by the Hebrews, Phenicians and Arabians; and the latter custom still prevails with the Chinese. But in modern times the most prevalent method is to write from left to right, as practised by all the civilized nations in Europe and America.

10. In learning to write, or in other words, in acquiring a knowledge of the art of penmanship, the pupil should strictly attend to the following directions.

11. *Manner of Sitting.* Let the edge of the desk be about as high as the elbows of the learner. Let him incline his left side towards the desk, resting principally on the left arm, with his right arm a small distance from the side.

12 Without leaning hard on the desk he should incline a little forward, so that his eyes may be a suitable distance from the paper. The paper should be kept parallel with the edge of the desk, and should be moved with the left hand as occasion may require.

13. As much of the ease, grace and elegance in writing depends on the manner of sitting, the attitude should always be such as to afford a free and easy movement of the right arm.

14. *Directions for holding the pen.* The progress of the pupil in learning to write is not unfrequently retarded by an improper method of holding the pen.

15. The pen should be held between the end of the thumb and the forefinger; resting on the middle finger near the corner of the nail.

16 The end of the pen should extend about three fourths of an inch beyond the middle finger. The end of the thumb should be nearly opposite the first joint of the forefinger; and the joints of the thumb and forefingers should be extended outward.

17. In learning to write, the pupil should be particularly careful that the hollow of the pen be turned directly

downward, and that the top of it points directly towards his right shoulder.

18. The movement of the pen on the paper should be directed by the fingers without moving the whole hand.

19. The pen should not be grasped hard; and should receive but a very light pressure, except in making the large full strokes.

20. In the first attempts at writing, the learner should write slow. He should give himself time to consider the proper thickness, length, curve and slope of every letter; and the distance that one letter should be made from another.

21. After the pupil is capable of writing a neat and correct copy hand, he may proceed to write with greater expedition, and adopt a more free and easy running hand, calculated for business.

22. Independent of the proper formation of letters, it is necessary in writing on any subject, to know the proper use of capital letters.

23. *A capital letter* should be used at the beginning of every sentence; and at the beginning of every line of poetry; the first letter of the name of every person or place should be a capital. The pronoun I, and the interjection O, should likewise be represented by capital letters.

24. Capital letters, separated from each other by a period, are sometimes used to represent words; as U. S. A. for United States of America. The following are the most common abbreviations of this kind.

25. A. D. in the year of our Lord, A. M. before noon, A. P. S. American Philosophical Society, B. D. bachelor of divinity, D. D. doctor of divinity, L. L. D. doctor of laws, M. S manuscript, N. B. mark well or take notice, P. M. afternoon, P. S postscript.

26. Abbreviations expressed by capital and other letters, thus, Co. company, Cr. credit, Cwt. hundred weight, Dr. doctor or debtor, Do ditto, the same, Esq. esquire, Gen. general, Hon. honourable, Id. the same i. e.

that is, Mr. mister, Mrs. mistress, No. number, per cent. by the hundred, Rev. reverend, St. saint, viz. that is to say, &c. and so forth.

27. Each of the states belonging to the American republic is known by particular letters or abbreviations, thus: Me. Maine, N. H. New Hampshire, Vt. Vermont, Ms. Massachusetts, Ct. Connecticut, R. I. Rhode Island, N. Y. New York, N. J. New Jersey.

28. Pa. Pennsylvania, Del. Delaware, Md. Maryland, Va. Virginia, N. C. North Carolina, S. C. South Carolina, Ga. Georgia, Ala. Alabama, Lou. Louisiana, Mi. Mississippi, Ten. Tennessee, Ky. Kentucky, O. Ohio, Ind. Indiana, Ill. Illinois, Mo. Missouri, D. C. District of Columbia.

29. Some of the months are expressed, by abbreviations as, Jan. January, Feb. February, Aug. August, Sept. September, Oct. October, Nov. November, Dec. December.

30. There are several characters and marks of reference usefully employed in a written composition. The carret (ʌ) shows an interlineation, or that some word has been omitted through mistake; as in the beginning, God

and the

created the Heavens, earth. A parenthesis ( ) is used

A

when one sentence is included in another; as, severity of correction (to be avoided as much as possible) is sometimes necessary.

31. A quotation ("—") is used when the words of one author are introduced into the discourse of another; as it is the duty of parents and teachers to endeavour to give a proper bias to the minds of youth, "just as the twig is bent, the tree's inclined;" virtuous habits formed in early life are seldom lost in manhood or old age.

32. A hyphen (-) is used to join parts of a word together; such as are compounded, as Pearl-street. It is likewise used when one part of a word is at the end of one line, and the other part at the beginning of another.

33. The star,* the cross,† and the ‖ parallel all refe to notes or observations at the bottom of the page.

34. In preparing a manuscript for the press, thos words to be printed in italics are designated by a singl line under them; and those to be printed in small capital are represented by two lines, and in large capitals by three lines.

ARITHMETIC.

ARITHMETIC is the science of computation by numbers it is that part of mathematics which shows us the righ use of figures, and enables us to calculate with ease, ex pedition, and propriety. Its whole operation is performe by numeration, addition, subtraction, multiplication, an division.

2. Arithmetic appears to have had its origin in som remote period of antiquity, of which history affords us n information. It is, however, believed from the testimon of some historians, that it was first studied as a science i Arabia. And we have it from the authority of Josephu that it was introduced from Asia into Egypt, where it wa considerably cultivated and improved.

3. From Egypt it was transmitted into Greece, wher it received additional improvements, and was the subje of particular attention, as mentioned in the writings Euclid, Archimedes and others. And from Greece it wa soon communicated to other parts of Europe.

4. The inhabitants of the early ages of the world mus however, have had some knowledge of numbers, thoug probably of but very limited extent. The various objec presented to their view, must have suggested to them th necessity of enumeration or computation.

5. Before the invention of numerical figures, it wa customary with several nations to represent numbers b the letters of the alphabet. The method which was ar

ciently pursued by the Romans, and which is practised on many occasions at the present day, is as follows, viz.

6. I, one; II, two; III, three; IV, four: V, five; VI, six; VII, seven; VIII, eight; IX, nine; X, ten; XI, eleven; XII, twelve; XIII, thirteen; XIV, fourteen; XV, fifteen; XVI, sixteen; XVII, seventeen; XVIII, eighteen; XIX, nineteen; XX, twenty; XXI, twenty-one; XXII, twenty-two, &c.

7. XXX, thirty; XL, forty; L, fifty; LX, sixty; LXX, seventy; LXXX, eighty; XC, ninety; C, one hundred; CC, two hundred; CCC, three hundred; CCCC, four hundred; D, five hundred; DC, six hundred; DCC, seven hundred; DCCC, eight hundred; DCCCC, nine hundred, M, one thousand; MDCCCXXIII, one thousand eight hundred and twenty-three.

8. In the theory of arithmetic we are taught the properties of numbers abstractly considered; and are made acquainted with the reasons, principles, and demonstrations of the several rules.

In practical arithmetic, we learn from certain numbers given, to find certain others, whose relation to the former is known.

9. By way of illustration, we will suppose two numbers, 5, and 10, for example are given, and we are to find their sum which is 15, their difference which is 5, and their product which is 50, and the quotient which is two.

10. The first thing necessary to learn in arithmetic, is numeration, or notation, which shows how figures are used to express numbers, and teaches the proper value of each figure in its respective situation. The following terms are applied in numeration.

11. The word *unit* means any one of the ten figures placed at the right hand of some others; and the word *tens* represents the second figure in going from the right hand towards the left. *Hundreds* represents the third figure; *thousands*, the fourth; *tens of thousands*, the fifth; *hundreds of thousands*, the sixth

12. The seventh figure stands for *millions*: the eighth

tens of millions, and the ninth *hundreds of millions*. Therefore the nine following figures 364, 752 981, represent three hundred and sixty-four millions, seven hundred and fifty-two thousand, nine hundred and eighty-one.

13 The nine figures with the cipher (0) are sufficient for all the practical purposes of arithmetic. Other terms have, however, been introduced to enumerate what is represented by a greater number of figures.

14. After hundreds of thousands of millions, which require twelve figures, we calculate by billions, trillions, quadrillions and quintillions, which follow the same order in reckoning as millions.

15 The following signs or characters are employed to great advantage in arithmetic; and their use and application should be well understood. Two parallel lines = denote equality.

16. The sign of addition marked thus + shows that two numbers are added together, as $4 + 6 = 10$; four added to six, are equal to ten. The sign of substraction, (—) shows that one number is taken from another, as $8 - 5 = 3$; eight less five, or five substracted from eight, leaves three.

17 The sign of multiplication × represents two numbers multiplied together, as $6 \times 8 = 48$; six times eight are equal to forty-eight; the sign of division ÷ represents one number divided by another, as $12 \div 4 = 3$; twelve divided by four, gives a quotient of three, or four is contained in twelve three times.

18. *Addition* is that operation by which we find the amount of several given numbers. In putting down the figures, the learner must observe that units be placed under units; tens under tens; hundreds under hundreds, &c.

19. In adding up, he must begin with the units, or right hand column; if the amount be more than nine, put down the right hand or unit figure, and carry the other to the next left hand column. In like manner proceed with all the columns, except the last, of which the whole amount must be put down.

20. *Substraction* is that part of arithmetic by which we learn to take a smaller from a greater number, in order to ascertain their difference. It is exactly the reverse of addition. The rule is to take units from units, tens from tens, hundreds from hundreds, &c.

21. If any of the figures of the lower line be greater than the corresponding ones of the upper, substract it from ten, and to the remainder add the upper figure: put down the amount, and carry one to the next figure.

22. *Multiplication* teaches the method of rightly ascertaining the product of any given number multiplied by another, the operation of which is performed agreeably to the following rule.

23. Place the smaller number under the greater, as in substraction: multiply the upper number by the lower one. First, multiply with the right hand figure; put down the unit figure of the product under the multiplier; multiply the next figure of the upper line, and to the amount add the left hand figure of the former product.

24. In like manner continue the operation, observing to put down the whole of every left hand product, till the upper line or multiplicand is multiplied by all the figures of the lower line or multiplier, after which add up the different products for the whole amount.

25. To multiply with facility, the learner should acquire a perfect knowledge of the multiplication table, which is as follows: Twice two are four; twice 3 are 6; twice 4 are 8; $2\times5=10$; $2\times6=12$; $2\times7=14$; $2\times8=16$; $2\times9=18$. Three times three are nine; $3\times4=12$; $3\times5=15$; $3\times6=18$; $3\times7=21$; $3\times8=24$; $3\times9=27$.

26. Four times four are sixteen; $4\times5=20$; $4\times6=24$; $4\times7=28$; $4\times8=32$; $4\times9=36$. Five times five are twenty-five; $5\times6=30$; $5\times7=35$; $5\times8=40$; $5\times9=45$. Six times six are thirty-six; $6\times7=42$; $6\times8=48$; $6\times9=54$. Seven times seven are forty-nine; $7\times8=56$; $7\times9=63$. Eight times eight are sixty-four; $8\times9=72$. Nine times nine are eighty-one.

Ten times two are twenty; $10\times3=30$; $10\times4=40$;

10×5=50, &c. Eleven times two are twenty-two 11×3=33; 11×4=44; 11×5=55, &c. Twelve times two are twenty-four; 12×3=36; 12×4=48; 12×5=60; 12×6=72; 12×7=84; 12×8=96; 12×9=108; 12×10=120; 12×11=132; 12×12=144.

27. *Division* is that operation which shows how many times one number is contained in another. That number which is to be divided is called the dividend, and the other the divisor.

28. The rule for division is when the divisor consists of several figures, to put the figure denoting the number of times the divisor is contained in the first left hand figures, to the right of the dividend; by which multiply the divisor, and place the product under the first figures made use of in the dividend; substract it from the same: then bring down to the right hand of the remainder the next figure of the dividend; continue the operation as before, till all the figures are brought down; the quotient will be the number sought.

29. Before the learner proceeds to add, substract, multiply or divide, when several denominations are given, such as miles, furlongs, poles, &c. a thorough knowledge of the following tables of currencies, weights and measures, should be acquired.

30. CURRENCIES. The currency of the United States consists of eagles, dollars, dimes, cents, and mills. But the most common calculation is by dollars and cents, without any regard to the other denominations.

31. The money of this country is calculated with much ease and facility; as ten of a lower denomination make one of the next higher; that is, ten mills make one cent; ten cents one dime; ten dimes one dollar; and ten dollars one eagle.

32. Sterling money is the currency of Great Britain; and is calculated in pounds, shillings, pence and farthings. Four farthings make one penny; twelve pence one shilling; and twenty shillings one pound; which is equal to $4,44 cents. But a pound Irish currency is equal to only $4, 10 cents. An English guinea is the value of 4 dollars, 66 cents and 7 mills.

32. In France, accounts are kept in livres, sols and deniers. 12 deniers make one sol; and 20 sols one livre; 3 livres one crown, equal to $1,10 cts. A Franc piece is equal to about 19 cents, Federal money. Consequently the value of a five franc piece is equal to 95 cents.

33. The denominations of the currency of Holland are guilders, stivers, groats and pennings. 8 pennings make one groat; 2 groats one stiver; and 20 stivers one guilder, = 39 cents.

34. In Hamburg and some other parts of Germany, accounts are kept in sous, marks and rix dollars. 16 sous make one mark; and 3 marks one rix dollar, the same as a dollar in the United States.

35. The currency of Russia consists of pennings, gross, florens, rix dollars and ducats. 18 pennings make one gross, 30 gross one florin, 3 florins one rix dollar, and 2 rix dollars one ducat. A ruble of Russia is equal to 66 cents.

36. The money of Spain is calculated in marvadies, rials, piastres, pistoles and doubloons: 34 marvadies make one rial, 8 rials one piastre, pizo or dollar; 5 piastres one pistole; 2 Spanish pistoles one doubloon equal to $14, 93 cts. and 5 mills.

37. The currency of Portugal is reckoned in reas, crusados and milreas. 400 reas make one crusado, and 1000 reas make one milrea, equal to $1,24.

A pagoda of India is equal to $1,94; a tale of China is $1,48; and a rupee of Bengal is the value of 55 cents 5 mills.

38. The people of the West Indies and South America, calculate their money principally after the manner of those European nations by whom their respective settlements have been formed.

39. WEIGHTS AND MEASURES. The denominations of weights and measures are different in different countries. Those of the United States, however, nearly correspond with what are used in Great Britain. But it may be

sufficient to give them only as they are used in this country.

40. Most of the articles of commerce are weighed by *avoirdupois weight*, in which 16 drams make one ounce; 16 ounces one pound; 28 pounds one quarter; 4 quarters one hundred weight, or 112 pounds; and 20 hundred weight one ton.

41. *Troy weight* is used in weighing silver, gold, precious stones, &c. In this weight 24 grains make one pennyweight, 20 pennyweights one ounce, and 12 ounces one pound.

42. *In apothecaries' weight*, which is used for mixing and preparing medicines, 20 grains make one scruple, 3 scruples one dram, 8 drams one ounce, and 12 ounces one pound.

43. *Dry measure* is used for measuring all articles bought or sold by the quart, peck, or bushel, except liquids. In dry measure, 2 pints make one quart, 8 quarts one peck, 4 pecks one bushel, and 36 bushels one chaldron.

44. *In liquid measure* 4 gills make one pint, 2 pints one quart, 4 quarts one gallon, 31½ gallons one barrel, 2 barrels or 63 gallons one hogshead, 2 hogsheads one pipe, 2 pipes, or 4 hogsheads, one ton.

45. *In cloth measure* 4 nails make one quarter of a yard; 4 quarters one yard, and 5 quarters one ell.

46. *Long measure* is used to determine the distance of one place from another; and relates to length only. The denominations are: 3 barley corns make one inch; 12 inches one foot; 3 feet one yard; 5½ yards one rod; 40 rods one furlong: 8 furlongs one mile, 3 miles one league; 60 geographic, or 69½ statute miles, one degree, and 360 degrees the circumference of the earth.

47. *Square measure* is used in measuring the surface of anything in which length and breadth are considered. In this measure 144 square inches make one foot, 9 square feet one yard, 30¼ yards one rod, or perch, 40 perches one

rood, and 4 roods one acre, and 640 square acres, one square mile.

48. *Solid measure* is applied to the measurement of solid bodies, of which length, breadth, and thickness are considered. In solid measure, 1728 inches make one foot, 27 feet one yard, 40 feet of round, or 50 feet of hewn timber, one ton; 128 solid feet one cord of wood.

49. *Time.* In the computation of time, 60 seconds make one minute, 60 minutes one hour, 24 hours one day, 7 days one week, 4 weeks one month, 13 lunar months one day and six hours, or 365 days six hours, or 12 calendar months, one year, and 100 years one century.

50. *Circle measure* is used by astronomers for ascertaining the revolutions of the heavenly bodies. The denominations are seconds, minutes, degrees and signs. 60 seconds make one minute, 60 minutes one degree, 30 degrees one sign, 12 signs or 360 degrees make the orbit or circle in which a planet performs a revolution.

51. Printers and bookbinders have particular terms to designate the number of pages made with one sheet, agreeable to the manner of folding. A sheet making 4 pages, 2 leaves, is denominated a folio; 8 pages, or 4 leaves, a quarto; 16 pages, or 8 leaves, an octavo; 24 pages, or 12 leaves, a duodecimo.

52. The following are the rules for working arithmetic when several denominations are given.

In compound addition, place the numbers under each other, so that each particular denomination will form a separate column. First add up the right hand column, or lowest denomination, and divide the amount by the number that it requires of the lowest to make one of the next higher; mark the remainder, and carry the quotient to the next column. In like manner proceed with all the denominations except the last, of which the whole amount must be put down.

53. In compound substraction, place the smaller quantity under the greater, with each denomination under its corresponding one, and take the smaller quantity from the

greater. If any of the lower denominations be greater than the upper, take it from the number it will take of that lower to make one of the next higher, to which add the upper figure; put it down and carry one to the next higher denomination, with which, proceed as with the first.

54. In working compound multiplication, place the multiplier under the lower or right hand denomination, and after multiplying that quantity, divide the product by the number it requires of said denomination to make one of the next higher.

55. Put down the remainder and add the quotient to the product of the next denomination, with which, proceed as before, observing to put down the whole product of the left hand, or highest denomination.

56. To work compound division, begin at the left hand and divide the highest denomination first; then multiply the remainder, if any, by that number which it takes of the next lower denomination to make one of the first, and to that product add the figure or figures of the second denomination; into which, divide as before. In like manner continue the operation from one denomination to the other, till the whole quantity be divided.

57. *Reduction* is the changing of a given quantity of one denomination into another of the same value. Reduction descending is performed by multiplication. The rule is first, to multiply the highest or left had denomination, by that number which it takes of the next lower, to make one of the highest; and to the product, add the figures of the second denomination.

58. Then multiply that product by the number it requires of the third denomination, to make one of the second, and to the product bring in the figures of the third: continue the operation in like manner, till the whole quantity is brought into the denomination required.

59. Reduction ascending, is the changing of any given quantity from a lower to a higher denomination, and is performed by dividing the quantity given, by the num-

ber it requires of a particular denomination, to make one of the next higher.

60. For example, if it be required to know how many days are in a certain number of minutes, we first divide by 60, which brings the whole quantity into hours; and, as 24 hours make one day, we next use that number for the divisor, which gives the required number of days.

61. *The single rule of three* is that useful and important operation in arithmetic, by which, with three terms given, we find a fourth. Of the given terms, the first and third must always be of the same name and kind, and the second term the same kind as the answer sought.

62. The rule for working the rule of three in direct proportion, is to multiply the second and third terms together, and divide their product by the first. The quotient will be the answer, in the same denomination as the middle term, when used in multiplying.

63. For example, if 12 yards cost 36 dollars, what is the value of 24 yards. The 36 dollars being multiplied by the 24 yards, gives a product of 864, which being divided by 12 yards, the first term, gives 82 dollars, the fourth term or answer.

64 Inverse proportion is that part of the rule of three which requires the third term to be greater than the first, and the fourth less than the second; or, that the third term should be less than the first, and the fourth greater than the second.

65. The terms are stated the same as in direct proportion; but the first and second terms must be multiplied together, and their product divided by the third term. Thus, if 36 men can finish a piece of work in 24 days, how many men can accomplish the same labour in 72 days. The answer is 12 men, which is found by multiplying the 36 and 24 together, and by dividing that product by 72.

66 The foregoing, embracing all the elementary principles of arithmetic, should be well understood. It is all that can conveniently be introduced into a work of this kind.

BOOK-KEEPING.

To be able to record the commercial transactions of merchants or other persons with precision and propriety, is an attainment only acquired from a competent knowledge of what is denominated *book-keeping.*

2. The necessity of this branch of education is so obvious, especially to those engaged in mercantile pursuits, as to render any further remarks on its utility unnecessary.

3. The books of a merchant should exhibit the exact state of his affairs. They should show the particular success of each transaction, as well as the general result of the whole; and should be so arranged as to afford correct and ready information upon every subject upon which they may be consulted.

4. Retail merchants, mechanics, farmers, &c. generally keep their books according to the method of single entry. This is a very simple, concise, and useful mode of keeping accounts, and requires but few books, seldom more than a Day-book, and Leger, or Post-book.

5. In the Day-book all the daily transactions are to be entered in succession as they occur in business, and in the leger, accounts of all the debtors and creditors, drawn out from the Day-book, are to be entered.

6. Wholesale dealers and merchants, who do extensive business, generally keep their books according to double entry, or the Italian method. Agreeable to this method several other books are required.

7. The most considerable books according to the method of double entry are the waste-book, the journal, and the leger; but besides these three, which are absolutely necessary, there are several others called subservient, or auxiliary books, which are used in proportion to the business a man has, or to the nature of the business he carries on. These books are the cash-book, the debt-

book, the books of wares or storage, the book of invoice, the book of account current and the book of commissions.

8. *The waste book* may be defined a register, containing an inventory of a merchant's effects and debts, with a distinct record of all his transactions and dealings, in way of trade, related in a plain simple style, and in order of time as they succeed one another.

9. The waste book opens with the inventory, which consists of two parts; first, the effects, that is, the money a merchant has by him, the goods he has on hand, his part of ships, houses, farms, &c. with the debts due to him; the second part of the inventory is the debts due by him to others: the difference between which and the effects is what the merchants call neat stock.

10. When a man begins in trade, the inventory is to be gathered from a survey of the particulars that make up his real estate; but ever after is to be collected from the balance of his old books, and carried to the new.

11. After the inventory is fairly related in the waste-book, the transactions of trade come next to be entered down; which is a daily task, to be performed as they occur. The narrative ought to exhibit transactions, with all the circumstances necessary to be known, and no more.

12. It should contain the names of persons with whom the merchant deals upon trust, the conditions of bargains, the terms of payment, the quantity, quality, and prices of goods, with every thing that serves to make the record distinct, and nothing else.

13. The waste-book, if no subsidiary books are kept, should contain a record of all the merchant's transactions and dealings in the way of trade; and that not only such as are properly and purely mercantile, but of every occurrence that affects his stock, so as to impair or increase it, such as private expenses, servant's fees, house-rents, money gained, &c.

14. *The journal*, is the book wherein the transactions

recorded in the waste-book are prepared to be carried to the leger, by having their proper debtors and creditors ascertained and pointed out: whence it may be observed, that the great design of the journal is to prevent errors in the leger.

15. Again, after the leger is filled up, the journal facilitates the work required in revising it; for first the waste-book and journal are compared, and then the journal and leger; whereas, to revise the leger immediately from the waste book would be a matter of no less difficulty, than to form it without the help of a journal.

16. Lastly, the journal is designed as a fair record of a merchant's business; for neither of the two other books can serve this purpose; the leger, on account of its brevity, being little more than a large index: nor can the waste-book answer this design, as it can neither be fair nor uniform, nor even accurate, being commonly written by different hands, and in time of business. Hence it is, that in case of differences between a merchant and his dealers, the journal is the book commonly called for, and inspected by a civil judge.

17. In the journal, persons and things are charged debtors to other persons and things as creditors; and in this it agrees with the leger, where the same style is used, but differs from it as to forms and order; so that it agrees with the waste-book in those very things where it differs from the leger; and on the other hand, it agrees with the latter in the very point where it differs from the former.

18. It may be observed, that every case or example of the waste-book, when entered into the journal, is called a journal post, or entrance; thus the examples above make three direct posts.

19. Accounts in the leger consist of two parts, which in their own nature are directly opposed to, and the reverse of one another, and are therefore set fronting one another, and on opposite sides of the same folio.

20. Thus all the articles of the money received go to

the left side of the cash account; and all the articles or sums laid out are carried to the right. In like manner, the purchase of goods is posted to the left side of the accounts of the said goods, and the sale, or disposal of them to the right.

21. Transactions of trade, or cases of the waste-book, are also made up of two parts, which belong to different accounts, and to opposite sides of the leger. If goods are bought for ready money, the two parts are, the goods received, and the money delivered; the former of which goes to the left side of the account of the said goods, and the latter to the right side of the cash account.

22. The two parts in any case in the waste-book, when posted to the journal, are denominated the one the debtor, the other the creditor, of that post; and when carried from thence to the leger, the debtor, or debtor part, is entered upon the left side (hence called the debtor side) of its own account, where it is charged debtor to the creditor part.

23. The creditor, or creditor part, is posted to the right side, or creditor side of its account, and made creditor by the debtor part. Hence Italian book-keeping is said to be a method of keeping accounts by double entry, because every single case of the waste-book requires at least two entrances in the leger, *viz.* one for the debtor, and another for the creditor.

24. From what has been said, it is evident that the terms debtor and creditor are nothing more than marks or characteristics stamped upon the different parts of transactions in the journal, expressing the relation of those parts to one another, and showing to which side of their respective accounts in the leger they are to be carried.

25. Having thus far explained the meaning of the terms debtor and creditor, we shall now proceed to the leger, or principal book of accounts.

26. *Of the leger.* The leger is the principal book, wherein all the several articles of each particular account, that lie scattered in other books, according to their dates,

are collected and placed together in spaces allotted for them, in such a manner, that the opposite parts of every account are set directly fronting one another, on opposite sides of the same folio.

27. The leger's folios are divided into spaces for containing the accounts, on the head of which are written the titles of the accounts, marked Dr. on the left hand page, and Cr. on the right: below which stands the articles, with the word *To* prefixed on the Dr. side, and the word, *By* on the Cr. side; and upon the margin are the dates of the articles, in two columns allotted for that purpose.

28. The money columns are the same as in other books; before them stands the folio column, which contains figures, directing to the folio where the corresponding journal-entrance of each article is made; for every thing is twice entered in the leger, *viz.* on the Dr. side of one account, and again on the Cr. side of some other account; so that the figures mutually refer from the one to the other, and are of use in examining the leger.

29. Besides these columns, there must be kept in all accounts, where number, measure, weight, or distinction of coin, is considered, inner columns, to insert the quantity; and for the ready finding any account in the leger, it has an alphabet, or index, wherein are written the titles of all accounts, with the number of the folio where they stand.

30. *How the leger is filled up from the journal.* Turn to the index, and see whether the Dr. of the journal-post to be transferred be written there; if not, insert it under its proper letter, with the number of the folio to which it is to be carried.

31. II. Having distinguished the Dr. and the Cr. sides, as already directed, recording the dates, complete the entry in one line, by giving a short hint of the nature and terms of the transaction, carrying the sum to the money columns, and inserting the quantity, if it be an account of

goods, &c. in the inner columns, and the referring figure in the folio column.

32. III. Turn next to the Cr. of the journal-post and proceed in the same manner with it, both in the index and leger; with this difference only, that the entry is made on the Cr. side, and the word *By* prefixed to it.

33. IV. The post being thus entered in the leger, return to the journal, and on the margin mark the folios of the accounts, with the folio of the Dr. above, and the folio of the Cr. below, and a small line between them thus $\frac{2}{4}$. These marginal numbers of the journal are a kind of index to the leger, and are of use in examining the books, and on other occasions.

34. V. In opening the accounts in the leger, follow the order of the journal; that is, beginning with the journal-post, allowing the first space in the leger for the Dr. of it, the next for the Cr. the third for the Dr. of the following post, if it be not the same with some of those already opened, and so on till the whole journal be transferred; and supposing that, through inadvertency, some former space has been allowed too large, you are not to go back to subdivide it, in order to erect another account in it.

35. Though these rules are formed for simple posts, where there is but one Dr. and one Cr. yet they may be easily applied to complex ones.

36. *Cash-book.* This is the most important of the auxiliary books. It is so called, because it contains, in debtor and creditor, all the cash that comes in and goes out of a merchant's stock.

37. The receipts on the debtor's side; the persons of whom it was received, on what and on whose account, and in what specie; and the payments on the creditor's side; mentioning also the specie, and reasons of the payments, to whom, and for what account they are made.

38. *Books of debts, or payments,* is a book in which is written down the day on which all sums become due, either to be received or paid, by bills of exchange, notes

of hand, merchandises bought or sold, or otherwise. By comparing receipts and payments, one may, in time, provide the necessary funds for payments, by getting paid such bills and notes as are due, or by taking other precautions.

39. *Book of wares.* This book is kept, in order to know readily all the merchandises that are lodged in the warehouse, those that are taken out of it, and those that remain therein.

40. *Book of invoices.* This book is kept, to preserve the journal from erasures, which are unavoidable in drawing up the accounts of invoices of the several merchandises received, sent out or sold; wherein one is obliged to enter every particular. It is also designed to render those invoices easier to find than they can be in the waste-book, or journal.

41. *Book of accounts current.* This book serves to draw up the accounts which are to be sent to correspondents, in order to settle them in concert, before they are balanced in the leger; it is properly a duplicate of the accounts current, which is kept to have recourse to occasionally.

42. The other mercantile books, as the book of commissions, orders, or advices; the book of acceptances of bills of exchange; the book of remittances; the book of expenses; the copy-book of letters; the book of postage; the ship-books; and the book of workmen; require no description.

43. MERCANTILE FORMS. As almost every person is more or less concerned in those instruments of writing which specify and sanction the contracts between individuals, it is highly necessary that the learner should become familiar with the proper manner of writing them.

44. A PROMISSORY NOTE.

$974,58 *Philadelphia, June 14th,* 1823.

Sixty days after date I promise to pay Moses Mor-

ton, or order, the sum of nine hundred and seventy-four dollars and fifty-eight cents, value received.

CALEB CRESSUS.

45. A NOTE ON DEMAND.

$525,64 *New York, July. 10th*, 1823.

On demand for value received I promise to pay Peter Pennyless, or order, the sum of five hundred and twenty-five dollars and sixty-four cents.

LUCAS LAWSON.

46. A JOINT NOTE BY TWO PERSONS.

Nine months after date we jointly, or individually, promise to pay James Juvenal, or order, the sum of seven hundred and ninety-nine dollars and twenty-five cents, value received.

SAMUEL SLINGER.
THOMAS TRUEMAN.

$799,25

47. A GENERAL RECEIPT.

Philadelphia, June 24th, 1823.

Received from John Lewis the sum of two hundred and ninety-four dollars in full.

JOSEPH JOHNSON.

£294

48. FOR MONEY RECEIVED ON ACCOUNT.

Baltimore, July 10th, 1823.

Received of Benjamin Davis the sum of fifty-nine dollars and fifty-three cents, on account.

£59,53

CHRISTOPHER CLARK.

49. FOR MONEY RECEIVED ON A NOTE.

Charleston, August 4th, 1823.

Received from John Jackson, by Jacob Spencer, eight

hundred and fifty dollars, which is endorsed on his not January 1st, 1824.

$850

RICHARD SIMMOI

50. FOR MONEY RECEIVED FOR ANOTHER PERSON.

Pittsburgh, Sept. 4th, 1823

Received from Charles Dayton three hundred and teen dollars and fifty cents on account of William Wil

JOHN MASC

$315,50

51. A DRAFT.

New-York, October 13th, 1823

Ten days after sight, pay five hundred and ninety-l dollars to Samuel Sullivan or order, value received, place the same to account of

Yours, &c.

ALEXANDER HOWARD, HENRY DIXC

Merchant, Savannah.

52. BILL OF EXCHANGE.

Philadelphia, Oct. 1st, 1823.

No. 1. EXCHANGE for *L*650. Sterl.

Twenty days after sight of this first of Exchange, (sec third and fourth, of the same tenor and date unpaid) to William Walker, or Order, Six Hundred and pounds Sterling, Value Received, and charge the sam account of

Yours, &c.

Thomas Tradewell.

James Harris & Co.

Merchants, London.

53. A LETTER.

Philad. Nov. 24, 1823.

Sir,

Enclosed you have bill of lading nd invoice of fifty seven chests of Tyson tea, and ten hogsheads of Cavanna sugar, forwarded by the ip Sea-fowl, agreeable to order.

Your ship Speculator has just rrived in this port from Amster- m; her cargo has been well selected nd will sell to great advantage.

Yours, respectfully,

Nathan Hill.

acob Fisher,

Merchant, Boston.

GRAMMAR.

GRAMMAR is that science which leads us to an investigation of the structure and genius of language, and teaches how to use words agreeably to the laws which custom has established for the regulation of speech.

2. English grammar makes us acquainted with the rules which general usage has adopted for either speaking or writing the English language.

3. In the first part of grammar we are taught the classification of words, according to their particular import.

4. The words of the English language, which are about thirty-seven thousand in number, are divided into ten classes, or parts of speech, designated by the following terms, viz. nouns, verbs, pronouns, adverbs, articles, adjectives, participles, prepositions, conjunctions, and interjections.

5. *A noun* or substantive signifies the name of every material substance; and of whatever can be the subject of an action. Every object in nature presented to our view or imagination, is therefore a noun.

6. Nouns are divided into common and proper. A common noun is the name applied to a particular class or species of things; as bird, fish, tree. And a noun proper is the name which represents an individual belonging to a certain class or kind of beings; as a swallow, a dolphin, a magnolia.

7. *A verb* is that part of speech which represents action or being; every operation or performance of a noun is consequently a verb. There are two kinds of verbs, active and neuter.

8. A verb is called active, when the operation of one noun acts upon another: as Cæsar *defeated* Pompey; Washington *drove* the enemy. A verb is denominated neuter when it is not followed by an object: as, he writes, they sleep.

9. *Pronouns* are used as the representatives of nouns,

and are generally introduced after the noun has been mentioned; as the sun has risen; *it* is the source of day. The word it, as will readily be perceived, is used to avoid a repetition of the word sun.

10. Words substituted for the names of persons are denominated personal pronouns: as I, thou, he, she, we, ye or you, they. And some words as who, which, what and that, are known by the name of relative pronouns.

11. *An adverb* is used to express some quality, circumstance or peculiarity of a verb, adjective, participle, or another adverb, and is usually placed next to the word which it is designed to affect or modify; as she behaves *discreetly*, and improves *very* fast.

12. Adverbs may be divided into particular classes, by which they will be more readily known. Besides such as denote quality, and are formed from adjectives and participles by the addition of *ly*, there are adverbs expressing number, order, place, time, quantity, doubt, affirmation, negation and introgation.

13. Adverbs of *number;* as once, twice, thrice. Of *order;* as firstly, secondly, thirdly, fourthly, lastly and finally. Of *place;* as here, there, where, elsewhere, anywhere, somewhere, nowhere, herein, whither, hither, thither, upward, downward, forward, backward, whence, hence and thence.

14. Denoting *time;* as now, to-day, to-morrow, monthly, yearly, already, before, yesterday, hitherto, long-ago, hereafter, instantly, presently, immediately, often, sometimes, soon, seldom, always, awhile, when, then, ever and never.

15. Adverbs of *quantity;* as much, little, sufficiently, how much, how great, enough, and abundantly. Those of *doubt;* as perhaps, peradventure, possibly, and perchance.

16. *Affirmative* adverbs, are; yea, surely, certainly, truely, undoubtedly, doubtless, verily, yea, indeed, really and a few others. Those of a *negative* kind are such as, nay, no, not, by no means, in no wise, &c.

17. Those of an *interrogatory* kind are; how, why, wherefore, whither, &c. There are others formed by the union of prepositions with adverbs denoting place; as hereof, thereof, whereof, hereto, thereto, hereby, thereby, whereby, herein, therein, wherein, therefore and wherefore.

18. There are a few other adverbs frequently used; as aside, abroad, ahead, asleep, ashore, aground and afloat.

19. *Articles* are used to point out and restrict the signification of nouns. There are only three words belonging to this class, *a*, *an*, and *the*. The article *a* is placed before nouns of the singular number only; as *a* globe, *a* map.

20. *An* is likewise placed before nouns of the singular number, but only such as begin with a vowel or silent *h*; as *an* eagle, *an* hour. *The* is placed before nouns of both numbers, as *the* apple, the apples. *The* is called the definite; and *a* and *an* the indefinite articles.

21. *Adjectives* serve to express the nature of nouns, and enable us to distinguish one object from another, by their qualities; as the *white* house, the *large* room, the *new* ship. Comparison is a term applied to adjectives, to denote the increase or diminution of their qualities. There are three degrees of comparison. The positive, as *good* or *bad*; the comparative, as *better* or *worse*. The superlative, as *best* or *worst*.

22. Nouns frequently become adjectives from their relation to other nouns; as *wheat* bread, *corn* field, *wine* vessel. All numbers; as one, two, three, forty, fifty, sixty, first, second, third, &c. are considered as adjectives.

23. *Participles* are words generally derived from verbs. They partake both of the properties of verbs and adjectives; and are usually formed by the addition of *ing* or *ed* to the verb. Thus from the verb learn, is formed the present participle learn*ing*, and the past participle learn*ed*.

24. *Prepositions* are used as connectives between nouns, to show the relation that persons, places and things bear

to each other; as he went *from* Philadelphia *to* Baltimore *with* his friends.

25. The most common prepositions are at, by, to, of, for, from, with, in, into, within, without, under, over, through, above, below, between, beneath, beyond, near, up, upon, down, before, behind, off, on, among, after, about and against.

26. *Conjunctions* are used to join sentences and parts of a sentence together; as the spring now succeeds the winter, *and* the face of the earth is drest in the blooming decorations of nature. *But* spring will soon pass away. In this phrase the words *and* and *but* are conjunctions; the former a copulative and the latter a disjunctive conjunction.

27. The principal copulative conjunctions are, and, if, both, then, since, because, therefore and wherefore.—And the most common conjunctions of the disjunctive kind are but, or, nor, as, than, lest, though, unless, either, neither, yet and notwithstanding.

28. *Interjections* are used in an exclamatory manner, expressive of wonder, regret, applause, &c. as O! what a beautiful prospect! *Alas!* my dearest friend is dead!—*Huzza!* the American navy. There are but about twenty words which may be called interjections.

29. *Derivations.* Nouns are formed from other nouns by the addition of *r*, or *er*, denoting an agent, as from love comes lover, from hate, hater. They are sometimes formed from other nouns by the addition of *hood* and *ship*; as manhood, lordship, from man, lord. Others are formed by *ment* and *age;* as commandment, parentage, from command and parent. Nouns are formed from adjectives by the addition of *ness*, as goodness from good, kindness from kind.

30. Verbs are formed from nouns by the use of *to*, as from love, fear, comes to love, to fear. They are formed from adjectives in the same manner, as to cool, to warm, from cool, warm. Verbs are formed from nouns and ad-

jectives by the termination of *ize*, as method, methodize, moral, moralize.

31. Adjectives are formed from nouns by the addition of *y* or *ly*, as rainy from rain, dusty from dust, princely from prince, and by adding ous, as courageous from courage, famous from fame, and by adding *ish*, as foolish from fool, slavish from slave, and by *al*, as national from nation, personal from person, and by *ful*, as beautiful from beauty, and hopeful from hope. They are likewise formed by the addition of *some* to the noun, as frolicksome, delightsome, from frolick, delight.

32. Adverbs are frequently formed from adjectives by the addition of *ly*, as wisely from wise, sweetly from sweet. And participles are derived from verbs by the addition of *ing*, as writing, walking, loving, from the verbs write, walk and love.

33. From the foregoing it must appear that nouns and verbs form the essence of language; the former comprehending the names of all objects, and the latter the names of all actions; and that the words belonging to the other parts of speech, are only used as their auxiliaries to represent some particular meaning, peculiarity, or circumstances concerning objects or actions.

34. But in addition to the names given to the different divisions of words, there are other terms usefully employed in grammar. They consist of number, person, case, gender, mood and tense.

35. *Number* is a term used to distinguish one from several things. When only one thing is mentioned, it is in the singular number; and when two or more are mentioned, they are in the plural number; as singular, the bird flies; plural, the birds fly. Hence it must appear evident that the verb must agree with its noun in number.

36. *Person* is used with nouns and pronouns; and consists of three kinds, designated by first, second and third. The first person is the person who speaks; the second person is the person *to* whom we speak; and the third person is the person *of* whom we speak. I, is the

first person, thou the second person, and he the third person in the singular number. And we the first person, you the second person, and they the third person in the plural number.

37. *Case* is used to represent the situation of nouns and pronouns. There are three cases; the nominative, possessive and objective. The nominative which is always the subject of a verb and generally precedes it; as *he runs, they walk;* and the possessive which implies the possession of property; as *Eliza's fan, his book;* and the objective which follows a verb, participle or preposition, and is governed by them; as I gave the book *to him*, they *instruct us.*

38. *Tense* serves to mark the distinction of time; and properly speaking consists of but three variations; the present, past and future. When an action is unfinished at the time it is mentioned, it is in the present tense; as I *am reading.* When an action has been finished at any former time it is in the past tense, as I *have read* the book; and when the action is not yet commenced, it is said to be in the future tense; as I *shall* or *will read* the *book.*

39. *Mood* is used to denote the particular manner in which a verb is expressed. There are five moods; the indicative, imperative, potential, subjunctive and the infinitive.

40. The indicative mood indicates the actual performance of an action, and is used for expresing affirmation, inquiry or denial; as I have finished my letter. Has the mail arrived? It has arrived; or it has not arrived.

41. The imperative mood is implied only in the second person; and is used when we express a command, entreaty, or permission; as give me that book; let me read; you may retire.

42. The potential mood is generally used with the auxiliaries may, can, might, could, would and should; and merely represents possibility or liberty to perform an action; as, it may rain; we can go; she might stay, &c.

43. The subjunctive mood implies the liberty to per-

form an action, unless prevented by future occurrences; as, we shall see you next week *if* we do not leave the city.

44. The infinitive mood denotes an action, without any reference to any particular agent; and without regard to person or number; as to walk, to run, to laugh.

45. The conjugation of a verb signifies the application of its several moods, tenses, numbers and persons, in order to vary its signification; as in the following example; *I study*, which is in the indicative mood, present tense, first person, singular number. *Let me study*, is in the imperative mood, future tense, second person, singular number. *If they study*, is in the subjunctive mood, future tense, third person, plural number. *He might study*, is in the potential mood, past tense, third person, singular number; and *to study*, is in the infinitive mood, present tense, without any reference to person or number.

46. *Syntax* teaches how to arrange and combine words, in forming sentences agreeably to the relation that one word bears towards another, in number, gender, case and person; and shows the government that one word has over another in directing its mood, tense or case.

47. The following, nearly the same as are given in Murray's Grammar, are the principal rules for the agreement, government and right position of words used in either writing or speaking the English language.

48. Rule I. *Every noun or pronoun the subject of a verb must be in the nominative case;* as I walk, *thou* comest, *he* runs, *they* write. This rule is sometimes violated by using the objective case instead of the nominative; as *thee* has adopted a peculiar mode of expression in order to be known amongst thy brethren. It should be *thou hast* adopted. *Him* who visited us last evening has left the city *Them* that indulge in dissipation generally come to want. *Him* should be *he*, and *them* should be *they*.

49. II. *A verb must agree with its nominative case in number and person;* as *he loves* his study; *they love* idleness; the *boys have* arrived; *thou shouldst* be diligent.

He *love*, they *loves*, the boys *has*, would be improper; as the verbs would not agree with their nominatives in number. Thou *should be*, would likewise be a violation of this rule, as thou is a pronoun of the second person, and *should be*, is a verb of the first or third persons.

50. III. *Nouns or pronouns of the singular number, joined together by a copulative conjunction, require a plural verb;* as Philadelphia *and* New York *are* important cities, John and William *were* here: To say *is* important cities, would be incorrect, because *is*, is a singular verb, not agreeing in number with its two nominatives which are made plural by being joined together by a copulative conjunction: and to say John and William *was* here, would be using a verb in the singular number when the rule requires it to be in the plural.

51. IV. *Nouns or pronouns of the singular number joined together by one or more disjunctive conjunctions, must have a verb agreeing with each of them in the singular number;* as Caroline *or* Maria *has* written this letter; James or Joseph *intends* to leave us. Therefore, to say Caroline *or* Maria *have* written; or James *or* Joseph *intend* to leave us, would be a violation of this rule, as it would be using a verb in the plural number when it should be in the singular.

52. V. *When nouns or pronouns of different numbers, are connected together by disjunctive conjunctions, the verb must agree with the plural, which should immediately precede it;* as John or Francis, or the girls *have* left these books in school, *has* left would be incorrect; his father or his sisters *instruct* him, not *instructs* him.

53. VI. *Pronouns must agree in number and gender, with the nouns they represent;* as oranges are very delicious, *they* are produced in warm climates. Our friend has left the city, *he* has gone to Pittsburgh. There are frequent violations of this rule; as this is the boy *which* done the mischief. Every man should mind *their* own business; day and night precede each other; *it* affords us an agreeable change. *Which* should be *who*; *their* should

be *his*, and *it* should be *they:* agreeing with the nouns which they represent in number and gender.

54. VII. *Active verbs govern the objective case;* as he censures *them;* he loves *her;* they encourage *us.* Therefore to say he censures *they*, he loves *she*, they encourage *we*, would be incorrect, as it would be using the nominative case instead of the objective.

55. VIII. *Prepositions govern the objective case*; as, I received the book *from him*, and gave it *to her.* This rule is sometimes violated by an improper use of the nominative case; as in the following; *who* do you speak to, who do you ask for; by who was the work done. In each of the foregoing examples the word *who* should be *whom*, and should be expressed thus: to whom do you speak; for whom do you ask, and by whom was the work done.

56. IX. *The preposition to, should not follow the verbs bid, dare, need, make, see and hear;* as I bade him come in, he dare not do it; he made me sit down; I bade him *to* come in, he dare not *to* do it; he made me *to* sit down, &c. would be improper.

57. X. *A participle with an article before it, requires the preposition* of *after it. But without the article before it, the preposition should not follow it;* as, *the* loving *of* our enemies is not a common practice, or loving our enemies; this was *a* betraying *of* the trust reposed in him; or this was betraying the trust reposed in him.

58. XI. *An adjective used to express a comparison between two things, should be in the comparative degree; but when used to express a comparison between three or more things, it should be in the superlative degree;* as, this is the *larger* apple of the two, or the *largest* apple of the three. It would therefore be improper to say this is the *largest* apple of the two, or the *larger* apple of the three.

59. XII. *Adjectives belong to nouns which they qualify or define; and adverbs relate to verbs, participles, or adjectives which they effect or modify.* It would therefore be improper to use an adverb to express the quality of a noun or an adjective to represent the manner of a verb, partici-

ple, or another adjective. In the following incorrect expressions, the adjective is used with the verb. He delivered his speech unaffected and fluent. It should be *unaffectedly* and *fluently*. They are miserable poor, should be *miserably* poor.

60. And it would be equally improper to use the adverb with nouns instead of the adjective. As how happily is that man, how splendidly an edifice, it was a delightfully interview. It should be how *happy* is that man; how *splendid* an edifice; it was a *delightful* interview.

61. XIII. *Every adjective must agree with its noun in number and the pronominal adjectives, each, every and either must have verbs agreeing with them in the singular number.* The following will show the useful application of this rule. I have occupied this house *these* five years, not this five years. *This* kind of conduct is very improper, not these kind. Each of us *is* happy; not are happy.—Every one *was* pleased; not were pleased. Either of the men *is* able to do it. Are able would be improper, because it would be using a plural verb when a singular one is required.

62. XIV. *Two adjectives of the same degree of comparison, should never be used to express the same quality of a noun.* The following examples will show the utility of this rule; he is the *most wisest* man in the company; this is a *more superior* work; should be, he is the *wisest* man; this is a *superior* work.

63. XV. *Two negative words should not be used in the same sentence; as they destroy the negative meaning of each other.* It would be improper to say I *cannot* write *no* more; or I did *not* say *nothing*. The correct expression would be I *can* write *no* more, or I cannot write *any* more. I *said nothing*, or I did not say *any* thing.

64. XVI. *The conjunctions if, though, except and whether, when used to express something doubtful or uncertain, generally require the subjunctive mood after them;* as, *if* I *were* to write, he would not answer my letter.—*Though* he *slay* me, yet will I trust in him. He will not

find mercy *unless* he repent. If I *was* to write, he *slays*, unless he *repents*, would be in opposition rule, as it would be using the indicative mood inst the subjunctive.

65. XVII. *Conjunctions sometimes require other ponding conjunctions; though or although requir neither* requires *nor*, and *either* requires *or*. The ing examples will show the propriety of this rule; as the house is small, but it is very convenient, *yet* it convenient. *Neither* Clarissa or her mother was at *nor* should supply the place of *or*. *Whether* I shall stay is uncertain; *nor* should be *or*, correspondin whither.

66. XVIII. *When the past tense and past particip verb are different, the past participle generally requi auxiliary;* as I *had written*, he would *have spoken*. It i said, he begun, for *he began*, he run, for he *ran*, he dru he *drank;* which is improperly using the partici place of the verb, in the past or imperfect tense; a following examples may guard us against using t perfect tense, instead of the participle; as, I had wr I had *written;* I was chose, for I was *chosen;* I ha for I have *eaten;* he would have spoke, for *woul spoken;* the sun has rose, for the sun has *risen;* p phers have often *mistook* the source of true happines *took* should be mistaken.

67. XIX. *A noun in the possessive case, denoti possession of property, should be marked by an apost and may be governed by the noun which it posses* Stephen's money; Joseph's house; Fanny's book; A paper. To say Albert *his* paper, Fanny *her* book omit the apostrophe would be in opposition to this

68. XX. *The interjections O, Oh and Ah! requ objective case of a pronoun in the first person, or t minative of the second person after them;* as, O m me! O thou! O ye! It would therefore be improper O I! Oh we! O him! Oh them! because *I* and pronouns in the nominative case of the first perso

him and *them* are pronouns in the objective case of the third person.

69. After the learner has acquired a thorough knowledge of the various parts of speech, and is able to assign to each word the class to which it belongs, he should learn by the application of the foregoing rules, the agreement, government, and right position of words in a sentence. This is called parsing; of which the following is given as an example.

70. 'Pride frequently produces pain.' *Pride* is a common noun or substantive, of the third person, singular number, and nominative case to the verb produces, in conformity to the first rule which requires every noun or pronoun the subject of a verb to be in the nominative case. *Frequently* is an adverb qualifying the verb produces.

71. *Produces* is an active verb, indicative mood, present tense, third person, singular number, agreeing with its nominative, pride; according to the second rule which says a verb must agree with its nominative case in number and person. *Pain* is a common noun, third person, singular number, and in the objective case, governed by the verb produces, agreeably to rule seventh, which says, active verbs govern the objective case.

72. 'A true sense of our ignorance leads to the acquisition of knowledge.' *A* is the indefinite article. *True* is an adjective relating to sense; articles and adjectives relate to nouns which they qualify or define. *Sense* is a noun in the singular number, nominative case to the verb leads, according to the first rule.

73. *Of* is a preposition. *Our* is a pronoun in the possessive case, governed by the noun ignorance, according to the nineteenth rule, which says a noun or pronoun in the possessive case may be governed by the noun which it possesses. *Ignorance* is a noun in the objective case, governed by the preposition of. The eighth rule says, prepositions govern the objective case.

74. *Leads* is a verb in the indicative mood, present

tense, singular number agreeing with the noun sense, a cording to the second rule, which requires a verb to agr with its nominative case in number and person. *To* is preposition. *The* is a definite article. *Acquisition* is noun in the objective case governed by the preposition according to the eighth rule. *Of* is a preposition. *Knov ledge* is a noun in the objective case governed by the pr position of: prepositions govern the objective case.

75. 'The Heavens declare the glory of God, and tl firmament showeth his handy work.' *The* is the defini article. *Heavens* is a noun in the third person plur number, nominative case to the verb declare; rule fir

76. *Declare* is an active verb, indicative mood, prese tense, plural number, third person agreeing with its nom native Heavens; rule second. *The* is the definite articl *Glory* is a noun in the objective case governed by decla agreeably to the seventh rule, which says active verl govern the objective case. *Of* is a preposition. *God* a noun in the objective case governed by the prepositic of.

77. *And* is a copulative conjunction. *The* is the d finite article. *Firmament* is a noun in the third perso singular number, and nominative case to the verb show eth. *Showeth* is a verb, indicative mood, present tens singular number, agreeing with the noun firmament. *H* is a pronoun in the possessive case. *Handy* is and adje tive relating to work. *Work* is a noun, singular numbe third person, objective case, governed by the verb show eth; rule seventh, active verbs govern the objective cas

78. The English language may be regarded as tl most copious and expressive language now spoken in tl world. But whoever will make himself thoroughly a quainted with its peculiar structure, cannot fail to discov many things in it, which are by no means authorized b reason or analogy.

79. But whatever forms of expression that have receiv the sanction of national usage, and have met the appr

bation of approved authors, cannot be considered as improper: For it is by custom,

"Whose arbitrary sway
Words and the forms of language must obey,"

that we are to be governed either in writing or speaking.

80. Some judicious observations on this subject are contained in Jamieson's Grammar of Rhetoric; from which we select the following. "It is not the business of grammar to give laws to fashions which regulate speech. From its conformity to these, it derives its authority and value.

81. Grammar is nothing else than a collection of general observations, methodically digested, and comprising all the modes previously and independently established, by which the signification, derivation and combination of words in a language are ascertained.

82. For these modes and fashions have no sooner became general, than they are the laws of the language. And the grammarian's only business is to note, collect and methodise them.

83. This truth concerns alike those comprehensive analogies and rules, which effect whole classes of words, and every individual word; in the reflecting and combining of which a particular mode hath prevailed.

84. Hence every single anomaly, though departing from the rule assigned to other words of the same class; and on that account called an exception, stands on the basis on which the rules of the language are founded, custom having prescribed for it a separate rule.

85. We may therefore admit as general principles, that *use*, whose essential qualities are *reputable* and *national*, is the sole mistress of language. Secondly, that grammar and criticism are but her ministers; and though like other ministers, they would sometimes impose upon the people the dictates of their own humours, as the commands of their sovereign, they are not so often successful in such attempts as to encourage a frequent repetition of them.

And finally that it is not by ancient, but by present use, that the style of every language must be regulated.

86. In every grammatical controversy, we are consequently as a last resort, entitled to appeal from the laws and decisions of the grammarians, to the tribunal of use, as the supreme authority.

87. Of different modes of expression, that which comes to be favoured by general practice, may be denominated best because established; but it cannot always be said in truth, that it is established because best.

88. Though nothing can be good in language from which use withholds her approbation, there may be many things to which she gives it, that are not in all respects worthy to be retained and imitated, and in some instances custom may very properly be checked by criticism.

89. The latter enjoys a sort of negative, though not a censorian power of instant degradation. She hath the privilege of remonstrating, and by means of this, when used discreetly, of bringing what is bad into disrepute, and so cancelling it gradually; but she hath no positive right to establish any thing."

GEOGRAPHY.

GEOGRAPHY is that pleasing and useful science, which offers to our consideration a description of the globe we inhabit, and teaches us not only its figure and natural divisions of land and water, but also makes us acquainted with its political subdivisions, consisting of kingdoms, states and empires.

2. The earth is a sphere of nearly eight thousand miles in diameter, revolving upon its own axis every twenty-four hours, and forming, a revolution round the sun every year, between the orbits of the planets Venus and Mars. It presents an irregular surface of land and water.

3. The land is divided into continents, islands, penin-

sulas, isthmusses, promontories, mountains, hills and vallies. And the water, which covers about three-fifths of the globe, consists of oceans, seas, gulfs, straits, lakes and rivers.

4. *A continent* is the largest division of land, and is not wholly surrounded by water. There are five continents, viz. North America, South America, Europe, Asia and Africa.

5. *An Island* is a smaller body of land, but is encompassed on all sides by water. *A peninsula* is a body of land connected to a continent, but almost surrounded by water. *An isthmus* is a narrow neck of land, which joins a peninsula to a continent, or two continents together.

6. *A promontory* is a high point of land, projecting a considerable distance into the sea. The highest elevations of land are called mountains, and smaller eminences are denominated hills. The land between two mountains or two hills, is denominated a valley.

7. *An ocean* is the largest division of water; there are four oceans, the Atlantic, the Pacific, the Indian, and the Northern oceans. *A sea* is a body of water less than an ocean. *A gulf* is a branch of the sea partly encompassed by land.

8. *A strait* is a narrow body of water, forming a communication from one sea to another. *A lake* or pool is a collection of water surrounded by land. *A river* is formed by the water of springs issuing from the earth.

9. There are other terms used in geography, to point out the situation of particular places, and to enable us to calculate the distance of one place from another.

10. *The axis* of the earth is an imaginary straight line passing through the centre of the earth, and pointing directly north and south; the extreme points of which are called the poles.

11. *The equator* is a supposed circle, surrounding the earth at an equal distance from the poles, and dividing the earth into two equal parts called hemispheres.

12. *Latitude* is the distance of any place from the equator towards either of the poles, calculated in degrees

and minutes. The distance either way can never exceed ninety degrees.

13. *Longitude* is the distance from any particular meridian, either east or west, and can never exceed one hundred and eighty degrees. All the degrees of longitude unite at the poles.

14. *Zones.*—Those circles used to divide the earth into zones, are the northern which is called the arctic, and the southern which is called the antarctic; and the two tropics cancer and capricorn; the former is twenty-three degrees and thirty minutes north of the equator, and the latter the same distance south of it.

15. There are five zones; the two frigid which extend from the arctic and antarctic circles to the poles; consisting of twenty-three degrees and thirty minutes, each. The two temperate zones which lie between the polar circles and the tropics, each of which embrace a region of forty-three degrees.

16. And the torrid zone which reaches from the tropic of cancer to the tropic of capricorn, and is forty-seven degrees in extent. The equator passes through the middle of the torrid zone.

17. North America, one of the five continents, a large and interesting division of the globe, extends from eight to seventy-five degrees of north latitude, and from fifty-five to one hundred and seventy-five degrees of west longitude.

18. It is bounded on the east by the Atlantic ocean; on the west by the Pacific ocean, on the north by the Frozen ocean, and on the south by the Carrabian sea and gulf of Panama, and is united to South America by the isthmus of Darien.

19. The principal inland seas of North America, are the gulfs of Mexico, California and St. Lawrence and Hudson's bay, and Baffin's bay.

20. The lakes of North America are the largest in the world. The principal of which are Superior, Huron, Ontario, Erie and Michigan. All of them situated upon the northern borders of the United States.

21. The rivers of this continent are numerous and of vast extent. The most important of which are the Mississippi; the St. Lawrence; the Ohio; the Missouri; the Columbia; the Tennessee; the Hudson; the Delaware; the Susquehannah; the Potomac, the James and Savannah rivers.

22. There are two ranges of mountains running through North America. The one is called the Alleghany, and the other the Rocky mountains. The former on the eastern, and the latter on the western part of the continent.

22. The principal islands on the coast of North America are New Foundland, Long Island, Cuba, St. Domingo, Porto Rico, and Jamaica. All situated in the Atlantic, and a few others scattered along the north-western coast.

23. The northern section of North America belongs to the British and native tribes of Indians. Canada constitutes the principal English settlement in America. Its chief towns are Quebec and Montreal, situated on the river St. Lawrence.

24. The southern part consists of Spanish settlements, of which Mexico situated between the gulf of Mexico and the Pacific ocean, is the chief city.

25. The United States and territories occupy the middle division, and embrace a fine region extending from about twenty-eight to forty-nine degrees of north latitude; according to the census of 1820, they contained a population of upwards of nine and a half millions of inhabitants.

26. They are bounded on the north by Canada; east by the Atlantic ocean; south by the Spanish provinces and the gulf of Mexico, and west by countries owned and occupied by different nations of Indians.

27. The seat of the general government of the United States, denominated the capital, is Washington city, situated on the east bank of the river Potomac in the district of Columbia, in latitude thirty-eight degrees fifty-eight minutes, and longitude seventy-seven degrees and two minutes, west from London; the district of Columbia, contains about thirty-three thousand inhabitants.

28. The states constituting the American republic are the following, of which Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine, lie north and north-east of Washington city.

29. And Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi and Louisiana, which lie south and south-west; and Tennessee, Kentucky, Ohio, Indiana, Illinois and Missouri, which lie west from Washington.

30. Maine is the most northern state. It is bounded on the north by Canada; on the west by Canada and New Hampshire; on the south by the Atlantic ocean, and on the east by New Brunswick. Its chief town and seat of government is Portland; distant from Washington city 554 miles.

31. Vermont is bounded on the north by Lower Canada; east by New Hampshire; south by Massachusetts, and west by New York. Its chief towns are Bennington, Windsor, Rutland, Burlington and Montpelier; the last mentioned is the seat of government, situated 524 miles from Washington.

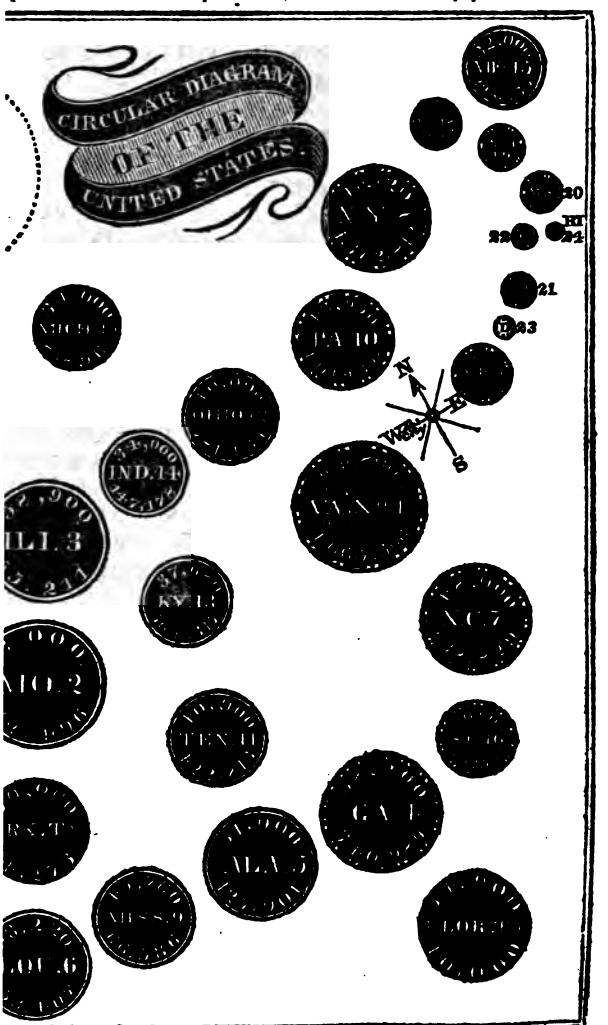
32. New Hampshire is bounded on the north by Lower Canada, on the east by Maine and the Atlantic ocean, on the south by Massachusetts, and on the west by Vermont; chief town is Portsmouth, seat of government Concord, 505 miles from the capital of the United States.

33. Massachusetts is bounded on the east by the Atlantic ocean; on the north by New Hampshire and Vermont, on the west by New York, and on the south by Connecticut and Rhode Island. Massachusetts contains a number of populous towns, of which Boston is the principal and is also the state capital; it is 436 miles distant from the seat of the general government.

34. Rhode Island is bounded on the north by Massachusetts; on the west by Connecticut, and on the south and east by the Atlantic ocean. Chief towns Providence and Newport. Providence is the seat of government; distant from Washington 416 miles.

THE UNITED STATES, REPRESENTED BY CIRCLES.

pper number exhibits the square miles, and the lower one the population of 1820



Square miles.		Population.		Square miles.		Population.
H. 19,	9280,	244,161.	C.	22,	4750,	275,248.
S. 20,	7800,	523,287.	D.	23,	2068,	72,749.
J. 21,	6900,	277,675.	R. I.	24,	1360,	83,059.

35. Connecticut is bounded on the east by Rho Island; north by Massachusetts; west by New York; a south by the Long Island sound. Its chief towns a Hartford, New London, and New Haven. Hartford, t present seat of government, is situated 338 miles fr Washington city.

36. New York is bounded on the north by the river S Lawrence; which separates it from Canada and the Lak Ontario and Erie; on the west and south by Pennsylvani New Jersey and the Atlantic ocean; and on the east Connecticut, Massachusetts and Vermont. It contai a large number of populous and flourishing towns; but chief cities are New York and Albany. The latter bei the seat of government for the state, is situated 356 mil from the seat of the general government.

37. New Jersey is bounded on the east by the Atlant ocean; on the north by New York; on the west by Pen sylvania; and on the south by the bay of Delaware a Atlantic ocean. Its chief towns are Newark, Elizabet town, New Brunswick, and Trenton. Trenton is t seat of government, and is 167 miles distant from t capital of the United States.

38. Pennsylvania is bounded on the east by the Del ware river, which separates it from New Jersey; on t north by New York; on the west by Ohio; and on t south by Delaware, Maryland and Virginia. Its chi city and the largest in the United States is Philadelphi Its other principal towns are Pittsburg, Lancaster, Ca lisle and Harrisburg. The last mentioned being the se of the state government, is situated on the Susquehan river, 113 miles from Washington city.

39. Delaware has the river Delaware and Atlant ocean on the east; Pennsylvania on the north, and Mar land on the south and west. Its principal towns a Wilmington, New Castle, Smyrna, Lewistown and Dov Dover is the seat of the state government, 135 miles fr Washington.

40. Maryland has for its boundaries Delaware and t

Atlantic ocean on the east; Virginia on the south and west, and Pennsylvania on the north. Its chief city is Baltimore. Annapolis is, however, the seat of government, situated 40 miles from Washington city.

41. Virginia is bounded on the east by the Atlantic ocean and the state of Maryland; on the north by Maryland and Pennsylvania; on the west by the states of Ohio and Kentucky; and south by North Carolina. Its chie towns are Richmond, Norfolk, Petersburgh, Alexandria, Fredericksburgh, and Lynchburgh. Richmond, situated on James river, is the capital of the state; it lies 128 miles from the capital of the United States.

42. North Carolina is bounded east by the Atlantic ocean; north by Virginia, west by Tennessee, and south by South Carolina. Its chief towns are Raleigh, Wilmington, Fayetteville and Newbern. Raleigh is the seat of the state government, situated 288 miles from Washington city.

43. South Carolina has the Atlantic ocean on the east; North Carolina on the north; and Georgia on the south and west. Its chief city is Charleston. Its other principal towns are Columbia, Camden and Georgetown. Columbia is the seat of government, distant from Washington 507 miles.

44. Georgia is bounded on the east by the Atlantic ocean and South Carolina; on the north by Tennessee, on the west by the country inhabited by the Creek nation of Indians; and on the south by East Florida; chief cities are Savannah and Augusta. Milledgeville is the seat of the state government, and is situated 675 miles from Washington.

45. Alabama is bounded on the east by Georgia; on the north by Tennessee; on the west by Mississippi, and on the south by Florida and the gulf of Mexico. Its chief towns are Mobile, St. Stephens and Huntsville. Cahawba is the seat of government, 950 miles from Washington city.

46. Mississippi is bounded on the east by Alabama,

on the north by Tennessee; on the west by the Mississippi river, which separates it from Louisiana; and on the south by Louisiana and the gulf of Mexico. Its chief city is Natchez. The other principal towns are, Washington, Fort Gibson and Monticello. The last mentioned being being the seat of government, 1,060 miles southwest from Washington city.

47. Louisiana is bounded on the east by Mississippi, on the north by the territory of Arkansaw, on the west by the province of New Mexico, and on the south by the gulf of Mexico. Its chief city and present seat of government is New Orleans, situated on the east bank of the Mississippi river, 1260 miles from Washington city.

48. Tennessee is bounded on the east by North Carolina, north by Kentucky, west by the Mississippi river, and south by the state of Mississippi. Its chief towns are Nashville, Knoxville and Murfreesborough, the last mentioned being the seat of government 740 miles from Washington.

49. Kentucky is bounded on the east by Virginia; on the north by Ohio and Indiana; on the west by the state of Illinois and the Mississippi river, and on the south by Tennessee. Its chief towns are Lexington, Louisville and Frankford. The last mentioned is the seat of government, distant from the city of Washington 565 miles.

50. Ohio is bounded on the east by Pennsylvania; on the north by Lake Erie and Michigan territory; on the west by Indiana, and on the south by Kentucky and Virginia. Its chief towns are Cincinnati, Chilicothe, Marietta and Zanesville. Columbus, situated 418 miles from Washington city, is the seat of government for this state.

51. Indiana lies west of Ohio, and is bounded on the north by Michigan territory; on the west by Illinois; and on the south by the Ohio river, which separates it from Kentucky. The principal town in this state is Vincennes. The seat of government is Corydon, distant from Washington city 666 miles.

52. Illinois is bounded on the south by the Ohio river, which separates it from Kentucky; on the east by Indiana

and Lake Michigan; on the north by the north-west Territory, and on the west by the Mississippi river, which separates it from Missouri. Its seat of government is Vandalia, distant from Washington city 900 miles.

53. Missouri is bounded on the east by the Mississippi river, which separates it from Illinois, and the states of Kentucky and Tennessee; on the north by the Missouri river; on the west by an uncultivated region belonging to various tribes of Indians; and on the south by the territory of Arkansas. The chief town and seat of government for this state, is St. Louis, 982 miles west from Washington city.

54. Michigan Territory is bounded on the south by Ohio and Indiana, on the east by the river St. Clair, which separates it from Upper Canada, and north-east by Lake Huron, and the north-west and west by Lake Michigan. Its chief town is Detroit.

55. Arkansas Territory is bounded on the north by Louisiana, on the east by the Mississippi river; on the north by Missouri, and on the west by the Indian possessions. Its principal town is Arkansas.

56. Florida is bounded on the north by Georgia and Alabama; on the south and west by the Gulf of Mexico, and on the east by the Atlantic Ocean. Its chief towns are St. Augustine and Pensacola.

57. South America stretches from the ninth degree of north, to the fifty-third degree of south latitude. It is bounded on the north by the Atlantic ocean, Carribbean sea and North America; on the east and south by the Atlantic ocean, and west by the Pacific ocean.

58. Some of the largest rivers in the world flow through the continent of South America; of which the Amazon, La Plata, and the Oronoko, are the principal.

59. The most elevated mountains in the world are found in South America. They belong to that vast range called the Andes or Cordilleras, running north and south through the continent. The soil and climate of South America are generally very favourable.

60. The northern extremity of South America c of the isthmus of Darien, which separates it from America; and in going from the northern to the so extremity of South America, we meet with the foll provinces, all of which are bounded on one side Atlantic ocean.

61. Those provinces are Darien, New Grenada, zuela, Cumana; which were settled by the Spa and Demarara and Guiana belonging to the Dutch. are next presented with the immense province of belonging to the Portuguese.

62. The principal settlements of Brazil, which the Atlantic ocean, are Amazonia, Pernambuco, Janeiro and Rio. South of the Portuguese possessio Buenos Ayres, settled originally by the Spaniards. south of Buenos Ayres lies the country of Patagonia, extends to the straits of Magellan. This country b to a nation of Indians called the Patagonians.

63. In traversing the continent from Patagonia rien, we meet with the following provinces, all of lie west of the Andes, and are bounded on the west Pacific ocean, and belong to the Spaniards.

64. After leaving Patagonia, we come into the pr of southern or modern Chili, we next reach north ancient Chili. From Chili we come into the provi Caraccas, and after leaving Caraccas we come in province of Cusco, and after passing through Cus come into Peru, and after passing Peru we enter th vince of Quito, which is bounded on the north by I

65. The principal islands upon the coast of America, are Trinidad, Juan Fernandes, Gallipago Pearl and Falkland islands, and the islands of Ter Fuego, which are situated at the southern extrem the continent. The most southern of these islands what is denominated Cape Horn.

66. Europe is a division of the globe of less than the other continents; but is distinguished for

pulation and improvements. It is divided into a variety of states, kingdoms and empires.

67. This continent is bounded on the west by the Atlantic ocean; south by the Mediterranean sea; east by Asia; and north by the northern ocean.

68. It consists of the following divisions, viz. Portugal, Spain, France, Netherlands, Germany, Hungary, Poland, Prussia, Denmark, Norway, Sweden, Lapland, Russia, Turkey, Italy and Switzerland.

69. The principal islands on the coast of Europe and in the European seas, are Great Britan, Ireland, Iceland, Zealand, Corsica, Sardinia, Sicily, Candia, Majorca, and Minorca. The six last mentioned are in the Mediterranean sea.

70. The principal cities in Europe are, London in Great Britain; Paris in France; Vienna in Germany; St. Petersburgh in Russia, Lisbon in Portugal; Madrid in Spain; Constantinople in Turkey; Stockholm in Sweden; Copenhagen in Denmark; Dublin in Ireland; Amsterdam in Holland; and Rome in Italy.

71. The principal inland seas of Europe are the Mediterranean, the Black sea, the Baltic and the White sea.

72. The chief rivers in Europe are the Wolga, the Danube, the Nieper, the Rhine, the Elbe, and the Thames.

73. The most important mountains are the Pyrenees, which divide France from Spain; the Alps which separate France from Italy; the Dofrafield which lie between Norway and Sweden, and the Carpathean mountains, which separate Hungary from Turkey and Poland.

74. The principal capes and promontories are the North cape, the Naze, the Land's End, the La Hogue, Finisterre, St. Vincent and Trafalgar.

75. Asia, the largest division of the globe, is bounded on the west by Europe and the Mediterranean sea; southwest by the Red sea; south by the Indian ocean; east by the Pacific ocean, and north by the Northern ocean.

76. Arabia, Persia, Hindostan and the Birman and

Chinese empires, occupy the southern part of Asia. Thibet and Chinese Tartary the middle, and Russia the northern.

77. The principal islands near Asia, are Ceylon, Sumatra, Java, Borneo, and the Phillipian islands, the islands of Japan, New Guinea and New Holland; the last mentioned is the largest island in the world.

78. The chief cities in Asia and the Asiatic islands, are Pekin, Nankin and Canton, of the Chinese empire. Ava, Pegu and Siam, of the Birman empire, Calcutta, Madrass and Bombay of Hindostan. Ispahan of Persia, Mecca and Madina of Arabia, Aleppo of Turkey, Astracan and Tobolski, in Asiatic Russia. Batavia on the island of Java and Jeddo, in Nephon one of the islands of Japan.

79. The principal inland seas of Asia are the Red sea, which separates Asia from Africa. The Persian gulf, the Arabian sea, the sea of Bengal, the Chinese sea, the Yellow sea, the sea of Okotsk, the gulf of Anadir, the gulf of Corea, the Caspian sea and the Black sea.

80. The principal rivers in Asia are the Ganges, Kian ku, Koan ho, Omur, Barampooter, Lena, Indus and Euphrates.

81. There are several ranges of mountains running through Asia; the most elevated are those of Thibet. The other mountains are the Uralian, the Altaian, the Shamo, the Caucassian, the Gauts of Hindostan, the Alsk and the Taurus.

82. The straits of Asia are those of Sunda, between Java and Sumatra, of Ormuz between Persia and Arabia, of Babelmandel which afford an entrance into the Red sea, and Behring's straits which separate Kamtschatka from the north-western coast of America.

83. AFRICA is a continent next to Asia in magnitude. It is bounded on the north by the Mediterranean sea, on the west by the Atlantic ocean, on the south by the southern ocean, and on the east by the Indian ocean. It is connected to Asia by the isthmus of Suez.

84. The northern part of Africa which borders the

Mediterranean sea, is occupied by the Barbary states, which extend from the straits of Gibraltar to Egypt. Those states are Morocco, Algiers, Tunis, Tripoli and Barca.

85. The eastern part of Africa consists of Egypt, Nubia, Abyssinia, Zangubar and Caffraria. The southern part is the land of Hottentots. The Dutch have, however, formed a settlement at the cape of Good Hope.

86. The western part of this continent consists of Angola, Congo, Loango, Mojombo, Guinea, Nigritia and the great desert of Sahara. The last mentioned being equal. in extent, to one half the continent of Europe. The interior of this continent is but imperfectly known.

87. The chief cities of Africa are Cairo in Egypt, Condar in Abyssinia, and Algiers, Tunis and Tripoli, in the states of the same names; Benan and Sofala, inhabited by black people are of some importance. The former is on the west, and the latter on the east side of the continent.

88. The chief part of the inhabitants of this continent are negroes, who exist in a state of ignorance and barbarism. The principal mountains in Africa are the mountains of the Moon; the Chiri and Lupata mountains, and the mountains of Komri.

89. The most important rivers of Africa are the Nile, which flows through Egypt into the Mediterranean sea; the Senegal, the Gambia and the Congo which empty into the Atlantic ocean. The Niger is also a river of Africa, which is supposed to lose itself in the sandy deserts, after flowing more than two thousand miles. Africa contains no inland seas; and no lakes worth noticing except that of Moravi.

90. The island of Madagascar upon the eastern coast of Africa, is next in size to New Holland. The other islands on the eastern coast, are the Comoro isles, the islands of Zanzabar and Pemba. The islands upon the western coast of Africa, are the cape Verde which are ten in number, and the cluster of islands called the Canaries.

91. The whole earth presents a surface of more than two hundred millions of square miles; of this it is estimated, that the land occupies something less than one third.

92. The land capable of being inhabited by human beings, may be estimated at about forty-five millions of square miles; of which North and South America contain about fourteen millions, Asia eleven, Africa nine, Europe five, and the different islands about six millions.

93. *Mechanical Geography.*—Mechanical Geography relates to the projection of maps and charts, and to the construction of artificial globes. There are two kinds of globes; the terrestrial and celestial, the former is employed to aid the learner in the acquisition of geographical knowledge, and the latter is used in astronomy.

94. The terrestrial globe is a miniature representation of the earth; exhibiting its true figure with the oceans, seas, continents, islands, lakes, rivers, states and empires delineated upon its surface.

95. The circular top of the frame supporting the globe is called the wooden horizon. One half of the globe being above and the other half below the horizontal plain.

96. On the wooden horizon is marked the thirty-two points of the mariner's compass. The characters and figures of the twelve signs of the zodiac, and a callender of months and days.

97. The brazen meridian is a circular piece of brass in which the globe is suspended by the extremities of its axis. It is supported at the bottom by a roller on which it turns and passes through the horizon in two grouves cut out for that purpose.

98. To one of the axis an index is attached which turns with it, over a circular brass plate containing the hours of the day.

99. The quadrant of altitude is a thin flat piece of brass so constructed that one end can be screwed on the brazen meridian, and the other part passing between the globe and the horizon may be turned to any point; being divid-

ed into ninety degrees, and these again subdivided into several parts, it is very useful in calculating the distance of one place from another.

100. *Problems.*—To find the latitude of any given place. Bring the place to the edge of the brazen meridian, and the degrees on the meridian over the place is the latitude.

101. II. To find the longitude of any given place. Bring the place to the brazen meridian, and the degree on the equator under the meridian is the longitude.

102. III. The hour of the day of any place being given, to find what o'clock it is at any other place, bring the place where the hour is given to the brazen meridian; set the index to the given hour; then turn the globe till the place proposed comes under the meridian; the index will point to the hour required.

103. IV. To find the distance in miles between any two places on the globe. Lay the quadrant of altitude over both places, and it will show the number of degrees, which multiplied by sixty-nine and a half will give the distance in miles.

104. V. The latitude and longitude of any place being given, to find that place. Look for the longitude on the equator, and bring it to the brazen meridian, then under the degree of latitude will be the place required.

105. VI. To find the difference of latitude of any two places, if they are in the same hemisphere, bring each to the brazen meridian and substract the latitude of the one from that of the other; but if in different hemispheres the latitudes of both places must be added.

106. VII. To find the difference of longitude of any two places, bring one of the places to the brazen meridian and mark its longitude; then bring the other place to the meridian and notice its longitude; the number of degrees between the two places will be the difference of longitude.

107. VIII. To rectify the globe for the latitude of a place. Elevate the pole above the horizon till its alti-

tude observed on the brazen meridian be equal to the l titude of the place, and it is then said to be rectified the latitude.

108. IX. To rectify the globe for the latitude, zeni and sun's place on any particular day. For the latitud elevate the pole above the horizon, according to the la tude of the place. For the zenith; screw the quadra of altitude on the meridian at the given degree of latitud counting from the equator towards the elevated pole. For the sun's place, find its place on the horizon, a then bring the same place found on the ecliptic to t meridian, and set the hour index hand to twelve at noo

109. X. To find at what hour the sun rises and sets any place, on any day in the year, and the length of t day and night at that place, rectify the globe for t latitude of the place; find the sun's place in the eclipt and bring it to the meridian, and set the index to twelv bring the sun's place to the eastern edge of the horizo and the index will show the time of rising; bring it to t western edge of the horizon, and the index will show t hour of setting. Double the time of sun-rising and it giv the length of the night; double the time of setting and will give the length of the day.

110. *Projection of maps.*—Maps are used to represent t earth's surface or parts of its surface upon plains. A gen ral map is the representation of the whole world in tv parts, called hemispheres.

111. A particular map exhibits only a part of t earth's surface; as one of its continents an island or a s parate state. The laying down of these maps is call projection.

112. In the construction of maps we are first to dra the lines or meridians of longitude and the parallels of l titude, by means of which we are enabled to give to plac their proper situations. We are then to exhibit as nea ly as possible the shape of such countries as we wish represent and to give the true bearing of one place fro another.

113. It is impossible to give an accurate representation of any country, on a map, on account of its being made upon a plain when the earth is globular.

114. In what is called marcator projection, the meridians and parallels of latitude are represented by straight lines. This kind of projection is used in forming *sea-charts*, wherein are exhibited some part of the sea, with the shores that bound it, together with the rocks and shoals and figures representing the soundings or depth of water.

115. In all maps the upper part is north, the lower part south: the right hand side east, and the left hand side west. On the right and left hand sides the degrees of latitude are marked; and the degrees of longitude are marked on the top and bottom.

ASTRONOMY.

ASTRONOMY is that sublime and interesting science, which makes us acquainted with the motions, distances, and magnitudes of the heavenly bodies. And affords us a knowledge of the laws which the Deity has established to govern the universe.

2. To ascertain the real motions of the heavenly bodies, was a difficult task, and required the united exertions of many ages. To investigate the laws, and causes of these motions, demanded the exertions of powers almost beyond the reach of the human faculties.

3. This has, however, been accomplished; and it has been demonstrated, that the most minute of the heavenly bodies, depend on the same general laws as those of the greatest magnitude.

4. Astronomy has therefore been highly regarded, as exhibiting one of the most remarkable instances of the extent and powers of the reasoning faculties of man.

5. When we cast our eyes towards the heavens, we

perceive a vast concave expanse, at an unknown distan
of which the eye seems to constitute the centre. T
earth stretches at our feet like an immense plain, a
appears to meet, and to bound the heavenly hemisphe

6. The circle around where the earth and heave
seem to meet, is called the horizon. And it is natu
to imagine, that besides the hemisphere which we p
ceive, there is another exactly similar, concealed fr
our view by the earth; and that the earth therefore
suspended in the middle of this heavenly hemisphe
with all its inhabitants.

7. A little observation turns this suspicion into c
tainty; for in a clear evening, the heavenly hemisph
is seen studded with stars; and its appearance is changi
every instant.

8. Those stars, that early in the evening are seen j
above the eastern horizon, will, at midnight, be seen
the middle of the starry hemisphere; and may be trac
moving gradually towards the west, till at length th
sink below the horizon.

9. *The sun* being the most conspicuous object se
from the earth, naturally claims our first attention
astronomy. It occupies the centre of a system, co
prehending the primary and secondary planets and t
comets.

10. The sun is the magnificent luminary which e
lightens these worlds; and by its presence, constitut
day. It is found to revolve upon its own axis, in 25 da
and 10 hours.

11. The time and direction of the sun's rotation, a
ascertained by the change of the situation of the spo
which are usually visible by the assistance of a telescop
These spots are frequently observed to appear and di
appear; and they are liable to great variation, thou
they are generally found about the same points on t
sun's surface.

12. It is found to be 25 days and 10 hours, from t

time any one of these spots leaves a particular point, till it appears again at the same place.

13. The sun was formerly supposed to be an immense globe of fire; but numerous observations, and the investigation of the properties of light and heat, have caused a different opinion in the minds of modern astronomers.

14. Dr. Herschel considers the sun as a most magnificent habitable globe: that this globe is surrounded by a double set of clouds; that those which are nearer its opaque body, are less bright and more closely connected together, than those of the upper stratum, which form the luminous globe we behold.

15. Also, that this luminous external matter is of a phosphoric nature, having several accidental openings in it, through which we see the sun's body, or more opaque clouds beneath; and that these openings form the spots we see.

16. The sun, as we see its external luminous surface, is about 870,000 miles in diameter; and about 95 millions of miles distant from the globe we inhabit.

17. The planets of the solar system revolve round the sun as their common centre, and receive from him the principles of heat, light and life.

18. The primary planets are as follow: Mercury, Venus, Earth, Mars, Jupiter, Saturn and Herschel. Some of these planets are accompanied by smaller globes, called moons, or secondary planets.

19. *Mercury* is nearest to the sun, and least in magnitude. Its distance from the sun is 37 millions of miles, and its diameter 3224 miles. It performs a revolution round the sun in 88 days.

20. This planet is very seldom visible. It never appears more than a few degrees from the sun's disk, and is generally lost in the splendor of the solar beams.

21. *Venus* is 68 millions of miles distant from the sun, and 7500 miles in diameter. It performs its revolution round the sun in 224 days.

22. Venus is largest, to appearance, of all the planets,

and is distinguished from the rest by its superior lustre It is generally called the morning or evening star, ac cording as it precedes or follows the apparent course o the sun.

23. *The earth*, the globe on which we reside, is 9 millions of miles distant from the sun, and 7970 miles i diameter. Its annual revolution round the sun, is 365 day and six hours; and its diurnal rotation, 24 hours.

24. The earth is attended with a secondary planet, o satellite, called the moon; which, from its being neare the earth than any of the other planets, appears the mos conspicuous object we see in the heavens, except the sun.

25. *The moon* is 250,000 miles from the earth, an about 2000 miles in diameter. She always keeps th same side towards the earth.

26. When the moon is viewed through a good tele cope, its surface presents a great variety of mountain ridges and cavities, and an irregular distribution of lan and water. She appears to have an atmosphere simil to the one which surrounds the earth.

27. The changes of the moon depend on her situatio in receiving light from the sun. When she is in oppos tion to the sun, her enlightened side is turned towards th earth, and she appears full. And when she is direct between the earth and sun, her dark side is turne towards us, and she appears invisible.

28. When she proceeds in her orbit, a small part her enlightened side is seen, and then we have a ne moon; and we continue to see more and more of th enlightened side, as she approaches her full.

29. One half of the moon has no darkness at all. Th earth constantly affording it light in the absence of th sun; while the other part has 14 days light, and 14 da darkness by turns. The earth seen from the moon, mu appear 13 times as large as the moon appears to us. Th ebbing and flowing of the tides are occasioned by the a traction of the moon.

30. *Mars* is a planet of 5350 miles in diameter. It performs a revolution round the sun in 686 days, at the distance of 145 millions of miles from it.

31. Some spots have been observed on the surface of this planet, from which its rotation on its axis, and the inclination of its axis to the plane of its orbit has been determined. Its daily revolution is found to be 24 hours, 39 minutes and 41 seconds.

32. *Ceres, Pallas, Juno and Vesta* are four small planets revolving round the sun between the orbits of Mars and Jupiter. They have only been observed by modern astronomers. Their orbits are very eliptical. Their diameters have been variously computed. That of the largest is probably something less than 500 miles.

33. *Jupiter* is a planet of greater magnitude than any of the others. Its diameter is 89,170 miles. Its distance from the sun, 494 millions of miles; and the time of its annual revolution, 4332 days, 14 hours. Its diurnal revolution is 9 hours 55 minutes and 50 seconds.

34. Jupiter is the brightest planet, except Venus: when viewed with a telescope, several belts are observed across its disk, parallel to its equator; these belts are variable, and are supposed to be ranges of clouds in the atmosphere of the planet.

35. Jupiter is surrounded by four moons, of different sizes, which move about it in different times. Eclipses of these moons are sometimes observed, by the shadow of Jupiter falling on them. Jupiter's polar axis being perpendicular to the plain of its orbit can have no diversity of seasons.

36. *Saturn* is 77,950 miles in diameter. It performs a revolution round the sun in 10,759 days, at the distance of 908 millions of miles from it. The time of its rotation upon its axis is 10 days and 16 hours.

37. This planet can hardly be seen by the naked eye When viewed by a telescope, it exhibits a very remarkable appearance. It is encompassed by a thin, flat, broad

luminous ring, which surrounds the body of the planet, but does not touch it.

38. This ring casts a strong shadow upon the planet, and is divided into two parts, by a distinct line in the middle of its breadth. Besides this ring, Saturn has seven moons of different sizes; and its body is also surrounded by belts like those of Jupiter.

39. *Herschel.* This planet, discovered by the celebrated astronomer Dr. Herschel, is 1800 millions of miles from the sun. Its diameter is 35,112 miles; and the time of its revolution round the sun, is equal to 31,845 of our days.

40. Herschel is never to be seen by the naked eye. It is attended by six satellites or moons. These moons are never seen but with the most powerful telescope.

41. The velocities of the planets in their orbits vary according to the distances from the sun. Herschel moves at the rate of 15,380 miles per hour, Saturn 18,000, Jupiter 25,000, Mars 47,000, Earth 68,140, Venus 69,600, and Mercury 95,000 miles per hour.

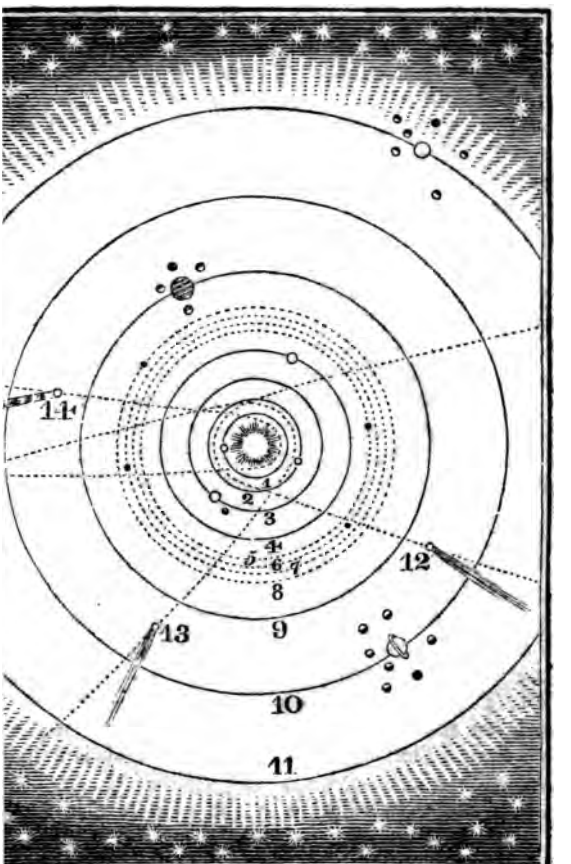
42. When any one of the heavenly bodies is obscured or darkened by the shadow of another falling it, or by the interposition of any body, it is said to be eclipsed. The eclipses of the sun and moon are the most striking of any.

43. They were formerly considered as ominous, and have often excited the dread and apprehensions of the vulgar; but the improvements in science show that they have no connexion with future events; that they depend upon regular causes, and can be calculated and foretold with the greatest certainty.

44 *The ecliptic* is the apparent path of the sun. All the planets move in a direction with it; and that space each side of the ecliptic which bounds their utmost deviations is called the *zodiac*, which is about 16 degrees in breadth.

45. The planets may be always found amongst some of the constellations which form the twelve signs of the

THE SOLAR SYSTEM.



...ts and their orbits. The Sun. *Planets and their orbits.*

...Mercury.
...Venus.
...Earth and moon.
...Mars.
...Ceres. 6. Palas. 7. Juno.
...Vesta.
...Jupiter with 4 moons.
...Saturn with 7 moons.

11. Herschel with 6 moons.
12. A comet.
13. A comet that appeared in 1682, and again in 1759, its period 76 years.
14. A very remarkable comet that appeared in the year 1680, and will appear again in 2255, after a period of 575 years.

zodiac.* These signs were probably considered by the ancients as bearing some distant resemblance to earthly objects. The names and characters by which they are known, are as follow: Aries ♈, Taurus ♉, Gemini ♊, Cancer ♋, Leo ♌, Virgo ♍, Libra ♎, Scorpio ♏, Sagittarius ♐, Capricornius ♑, Aquarius ♒ and Pisces ♓.

46 *Nodes* are two prints where the orbit of a planet intersects the plane of the ecliptic. *Declination* of the sun, moon or stars, is their distance north or south from the equator, reckoned in degrees and minutes upon a circle, which is perpendicular to it. *Digit*, in astronomy is the twelfth part of the sun's diameter, which is often used in the calculation of eclipses.

47. *Equinoxes* are two points where the ecliptic cuts or intersects the equator. When the sun is in either of these situations the days and nights are equal to each other. *Solstitial point* are the two points of the zodiac, Cancer and Capricorn, at which the ecliptic touches the tropics, and into which the sun enters on the longest and shortest days.

48. *Transit* is the passing of one celestial body before another; so as to render any part of it invisible. *Penumbra* is a faint shadow, which accompanies an eclipse, and occasions a partial obscurity of the body to that part of the earth on which it falls.

49. The *disk* of the sun or moon is its round face, which, on account of the great distance of the object appears flat. The edge or border of the disk is called the *limb*.

50. *Comets.* In addition to the planets already men-

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* The names of these signs in English may be recollected by the following lines.

The *ram*, the *bull*, the heavenly *twins*,
And next the *crab* and *lion* shines,
The *virgin* and the *scales*;
The *scorpion*, *archer* and the *goat*,
The *man* that holds the water pot,
And *fish* with glittering tails.

tioned, there are other bodies which traverse infinite space, called comets. But as they are seldom seen more than once by the same observers, their nature and use in the planetary system are but little known.

51. An universal connexion between all parts of the siderial heavens is now generally admitted. Comets undoubtedly form a part of this great chain; but of the part they occupy, and the uses for which they exist we are in a great measure ignorant.

52. They move round the sun with great velocity, in eliptical orbits. We can never see them but when they are in that part of their orbits which is nearest to the sun.

53. The number of comets is unknown. More than a hundred have been observed. Several small ones are frequently discovered by the telescope, that are not visible to the naked eye.

54. The distances of the comets are inconceivably great; and most of them move entirely beyond the orbits of the planets. One of them has been more than 500 years in performing a revolution. That part of a comet's orbit which is nearest to the sun, is called its perihelion; and the remotest part from the sun, its aphelion.

55. The appearance of the comets are various. Some appear only like a faint vapour; others seem to have a nucleus or solid part in the middle.

56. When they approach the sun, they put forth the appearance of a beard or tail of luminous matter, which is sometimes of an astonishing length. These tails are always in a direction from the sun.*

57. The largest comet that has been observed, was nearly equal in magnitude to the planet jupiter. Its tail extended about 33 millions of miles.

58. *The fixed stars*, are so called, because they do not move in orbits like the planets, but remain stationary. They appear of an infinite variety of sizes; yet for con-

* The comet No. 14, was not laid down correctly on the plate.

venience, it is usual to class them into six or seven magnitudes. The largest are called stars of the first magnitude; those next largest, of the second magnitude, &c.

59. In viewing the firmament in a clear evening, the stars appear innumerable. But the number visible to the naked eye, is not more than 3186; and but about one-third of this number can be seen at one time.

60. Those stars are considered by astronomers, as suns to other systems of worlds. Each of them, though at such an immense distance from us as to appear only as a glittering point in the blue expanse of heaven, is supposed to be like our sun in size, and destined to give light to a retinue of worlds which revolve around it.

61. What an august! what an amazing conception does the science of astronomy give of the works of the Creator! Instead of one world, and one sun, we find thousands and thousands of suns ranged all around us, at an immense distance from each other.

62. And these suns attended by innumerable worlds, supposed to be the abodes of intellectual life, all in rapid motion; yet invariably keeping the paths prescribed them by the Almighty.

63. Hence it is, that we can perceive no bounds of the vast expanse in which nature's causes operate; and can fix no borders nor termination to the universe.

64. The objects which we commonly call great, vanish when we contemplate the vast body of the earth; the terraqueous globe itself is lost in the solar system; in some parts, it is seen as a distant star; and at other places, utterly unknown.

65. The sun itself dwindles into a star; saturn's vast orbit, and the orbits of all the comets, crowd into a point, when viewed in numberless places between the earth and the nearest of the fixed stars.

66. Where beaming sol, a trinkling gem appears,
Mysterious works, the hand of God has wrought!
Comets and suns, and circumvolving spheres,
Exist beyond the reach of human thought.

67. Other suns kindle light to illuminate other systems, when our sun's rays are unperceived, being all swallowed up in the vast expanse.

68. Even all the systems of the stars that sparkle in the clearest sky, must possess a small corner only of that space through which such systems are dispersed, since more stars are discovered in one constellation by the telescope, than the naked eye can perceive in the whole heavens.

69. After we have risen so high, and left all definite measures so far behind us, we find ourselves no nearer to a term or limit; for all this is nothing to what may be displayed in the infinite expanse, beyond the remotest star that has ever been discovered.

GEOMETRY.

GEOMETRY, in its original sense, related simply to the measurement of the earth. But in its present acceptation, signifies the science of extension and magnitude in general.

2. Its application to the use and ornament of mankind, is very important and extensive. Furnished with its assistance, geographers are enabled to ascertain the size of the globe, the extent of oceans, and the various divisions of the earth.

3. From geometry the architect derives his just measures and proportions for the construction of all kinds of buildings. By its assistance the surveyor measures land, and delineates the plans of towns, &c.

4. It supplies fundamental rules for navigation and astronomy, and enables us to ascertain every degree of height and distance, and is connected with almost every kind of mechanism.

5. Geometry was first invented by the Egyptians, whose lands bordering the Nile being annually inundated,

required to be frequently measured out to its respective owners, so that each one might repossess his property.

6. And in the operations attendant on that act of justice, many discoveries were made relative to the properties of figures which gradually led to an extension of the science, and to the cultivation of the arts of navigation and astronomy, which indeed first flourished in that quarter.

7. We are rather in the dark, as to many improvements made in the infancy of geometry, and its attendant speculations; many tracts of supposed value have been entirely lost, though some faint traces and fragments, have from time to time been discovered.

8. At present, geometry is justly considered as the basis of many liberal sciences, and as an indispensable part of the education of those who propose to exercise the more mechanical arts to advantage.

9. We shall only submit to our readers a general view of the terms and definitions used in geometry, which may open the field to farther advancement, and prove highly useful in the practical operations of this science.

10. The subsequent terms and definitions, are the same as are given in Euclid's Elements, and to be well understood, they should engage the serious attention of the student.

11. *Definitions.* A point hath position, but hath neither parts nor magnitude. The ends or bounds of lines are points. A right line lies evenly between two points. A superfic or plain has only length and breadth. Plains are bounded by lines. A plain surface lies evenly and level between its lines.

12. A plain angle is formed by the meeting of two right lines. When an angle contains ninety degrees, it is called a right angle. When less than ninety, it is said to be an acute angle. When more than ninety degrees, it is called an obtuse angle.

13. A term or bound implies the extreme of any thing. A figure is contained under one or more bounds.

14. A circle is a plain figure contained in one line,

ts circumference; every where equally distant certain point within it. The equidistant point a circle is called its centre.

A line passing from one side to the other of a cir- through its centre, is the greatest line it can con- d is called its diameter. The diameter divides the ito two equal and similar parts called semi-circles. When a line shorter than the diameter, is drawn e point to another, on the circumference of a circle, ed a chord. That part cut off, or divided by such is called an arc or segment.

Figures contained under right lines are called right- gures. A figure having three sides is called a trian- all the sides of a triangle are of the same length, it l an equilateral triangle. If all the sides and angles qual, it is called a scalene triangle.

If two of the sides are of equal length, it is called crural triangle. If containing a right angle, it is right-angled triangle. The long side subtending osite to the right angle, is called the hypothenuse. When the two shortest sides of a triangle stands ater angle than ninety degrees, the figure is said tuse, and when all the angles are less than ninety , it is called an acute-angled triangle.

When two lines preserve an equal distance from her, they are said to be parallel. Parallel lines may r straight or curved, but they can never meet.

A figure having four equal sides, and all the angles s a square. But if its opposite angles only be equal vely, the figure will then be a rhombus. When sides of a figure are right lines, and the opposite e parallel and equal, it is called a parallelogram. If the opposite sides are equal, the others being l, the figure is called a rhomboides. Four sided unequal in all respects, are called trepesia.

Figures having more than four sides, are called s, and are thus distinguished; with five sides is a n; with six, an hexagon; with seven, an heptagon;

with eight, an octagon; with nine, an enneagon; wit ten, a decagon; with eleven, an endecagon; with twelv a dodecagon.

24. A solid has length, breadth and thickness. A pyramid is a solid standing on a base, of any number o sides, all of which converge from the base to the sam point or summit.

25. When standing on a triangular base, it is called triangular pyramid; on a base of four equal sides, a squar pyramid; on five, a pentagonal pyramid; and thus in con formity with the figure of its base.

26. A cone is found by the revolution of a triangle o its epex, or summit, and a point situated in the centre o its base; therefore a cone like a sugar-loaf has a base bu no sides. A prism is a figure contained under plain whereof the two opposite are equal, similar and paralle and all the sides parallelograms.

27. A sphere is a solid figure, generated by the revo lution of a circle on its diameter, which is thence called i axis. A cube is a solid, formed of six equal and mutuall parallel sides, all of which are squares.

28. A tetrahedron is a solid contained under four equa equilateral triangles. A dodecahedron is a solid con tained under twelve equal, equilateral, and equiangul pentagons.

29. An icosahedron, is a solid contained under twen equal, equilateral triangles. A parallelopipedon is figure considered under six duadralateral figures or plain whereof those opposite are respectively parallel.

30. Figures, or bodies are said to be equal, when the bulks are the same; and similar when they are alike form, though not equal. Therefore similar bodies are each other in proportion to their respective areas bulks.

31. The line or space on which a figure stands, called its base; its altitude is determined by a line drav parallel to its base, and touching its vortex or highest pa A right lined figure is said to be inscribed within anothe

when all its projecting angles are touched thereby. The figure surrounding or enveloping another is said to be described around, or on it.

32. When a line touches a circle, and proceeds without cutting it, such line is called a tangent. Any portion, less than a semicircle, taken out from a circle by two lines proceeding from the centre, is called a sector.

33. It may not be improper here to remind the pupil, that all the angles within a circle, cannot amount to more nor less than three hundred and sixty degrees, nor in a semicircle to no more nor less than one hundred and eighty degrees. That the value or measure of an angle is not affected or changed by the lines whereby it is formed, being either lengthened or shortened.

34. That two lines standing at an angle of ninety degrees from each other, will not be affected by any change of position of the entire figure in which they meet, but will still be mutually perpendicular.

NAVIGATION.

NAVIGATION is the art of conducting a vessel from one port to another by observation of the heavenly bodies, calculation of the distance, or way, made daily, and by steering such a course, under guidance of the compass, as may lead, in the most direct manner, from the place left to the place of destination.

2. It is an art which has the highest claims to our regard, as being the means of diffusing the knowledge and improvements of the people of one country, amongst those of another.

3. It has for several centuries been successfully studied and practised, by almost every nation engaged in commercial pursuits.

4. As this art is connected with certain known principles in geometry, geography and astronomy, the student

should acquire a competent knowledge of these scienc previous to the study of navigation.

5. *The mariner's compass.* As the most important inst ment used by navigators, at sea, is the mariner's comp we shall in the first place, give a short notice of its c struction.

6. It consists of a circular brass box, which conti a paper card with the thirty-two points marked on This card is fixed on a magnetic needle that always t to the north, excepting a small variation, for wl allowance should be made in the ship's course.

7. The needle with the card, turns upon an upr pin fixed in the centre of the box. To the middle of needle is attached a brass conical socket, or cap, which the card hanging on the pin, turns freely round centre.

8. The top of the box is covered with a glass, to vent the wind from disturbing the motion of the c The whole is enclosed in another box of wood whic suspended by brass hoops, or gimblas to keep the car a horizontal position during the motion of the ship.

9. The four cardinal points, north, east, south west, form the terminations of two diameters, standin right angles: the four points ascertained by dividing four quadrants into equal portions each, give compo points, which are named after the two cardinals betw which they are drawn.

10. Thus the mid-points between north and east, called "north east," and between north and wes called "north-west," between south and east "so east," and between south and west "south-west."

11. By this process we have divided the circumfer into eight equal parts. Now let each segment betw the several cardinals, and their compounds, be div into four equal portions, so that the whole circle ma partitioned into thirty-two equal parts, being the w number of points of the compass.

12. The two points next to north, will be "nortl east" and "north by west;" those next to east, wil

"east by north" and "east by south;" while those nearest to west, will be "west by north" and "west by south."

13. The two next to the compounds will be as follows: to north-east, they will be "north-east by north" and "north-east by east," to south-east, they will be "south-east by south" and "south-east by east," to north-west they will be "north-west by north" and "north-west by west" and "to south-west, they will be south-west by south" and "south-west by west."

14. There yet remains eight points equidistant between the several cardinals and the compounds; these have their designations made by prefixing, to that of the adjunct compound, that of the cardinal which is nearest.

15. Thus between north and north-west, the point is called "north, north-west," and that between north-west and west, is called "west, north-west," and thus we have "north, north-east," "south, south-west," and "west, south-west," "south, south-east," and east, south-east.

16. The points of the compass are generally represented by the first letters of their names, as in the following: beginning at north. N.—N. by W.—N. N. W.—N. W. by N.—N. W.—N. W. by W.—W. N. W.—W. by N.—W.—W. by S.—W. S. W.—S. W. by W.—S. W.—S. W. by S.—S. S. W.—S. by W.—S.—S. by E.—S. S. E.—S. E. by S.—S. E.—S. E. by E.—E. S. E.—E. by S.—E.—E. by N.—E. N. E.—N. E. by E.—N. E.—N. E. by N.—N. N. E.—N. by E. The next point would be north, the one at which we commenced.

17. A rhomb-line is a straight line drawn from the centre of the compass to the horizon, and is named from that point of the horizon it falls upon. The course is the angle which any rhomb-line makes with the meridian; and is sometimes reckoned in degrees, and sometimes in points of the compass.

18. When a ship makes a direct course from one point, or port to another, and there is no current, nor variation of the compass, she sails "on a rhomb;" that is, she

is guided invariably from one to the other throughout her course, by one point of the compass, being governed the whole of her passage by that line only. This is different from what is called traverse sailing.

19. *Traverse sailing.*—Traverse sailing is when adverse winds or currents oblige the vessel to change her course occasionally; especially, when the vicinity of land renders it necessary to steer at times differently.

20. When the wind is obliquely against a ship's direct course, she makes traverses, or zig-zag stretches, which is effected by laying her head as close to the wind as will allow her sails to be filled when close hauled.

21. When working in this manner, it is called "beating" or "plying to windward;" when the wind blows straight against the side of a vessel, it is said to be on the beam; when between her side and stern, it is called a quartering wind, or on her quarter; when direct astern or near it, she is said to be before the wind.

22. In traverse sailing, the vessel's head is usually turned up "into the wind" when she is "put about." This is called "tacking;" but instead of "throwing her up" in that manner, she is allowed to go round from the wind until it comes or is met by her on the other side, this is called "wearing."

23. When she has the wind on her starboard or right bow, she is said to "have her starboard tacks aboard;" and her "larboard tacks aboard" when her left bow is to the wind.

24. To know how close a ship will lay to the wind, observe the course she goes on each tack; supposing for example, it be north on one, and south-west on the other; divide in the middle, and her course will appear to be west north-west.

25. But allowance must be made for leeway, which is the loss occasioned by the impression made on the vessel as she is working to windward; when the wind presses her from the direct line of her course, and occasions her to drift to lee-ward.

26. The distance a ship sails per hour, is ascertained by means of a small piece of board called the log, that being fastened to a small line, and lowered over the stern, occasions the line to run off from a large reel.

27. The line being marked at certain distances with small pieces of string, whereon one, two, three, &c. are made at distances corresponding with the rate per hour, and the person who superintends the process, having a minute, or half minute glass, the number of knots on the line which run off, indicate the number of miles the ship sails per hour.

28. The following is the general rule for laying down a traverse course on paper. Having drawn the meridian and parallel of latitude, or east and west line in a circle representing the horizon of a place, mark in the circumference the place of the wind, that is, the point from which it blows.

29. Then draw your rhomb line passing through the place bound to, and lay thereon the distance of that place from the centre; on each side of the wind lay off in the circumference those points which show how near the wind the vessel can lie and draw their rhombs.

30. Now the first course will be one of these rhombs, according to the tack the ship falls upon; when she goes on the other tack, it will be at such an angle as may correspond with her ability to lay near the wind; but in general for square rigged vessels it should be twelve points, that is, six for the distance on each tack.

31. But where the wind is not directly adverse, it would be improper to make the tack, towards the rhombs, of equal duration or length. Therefore that tack should be longest which lays nearest the intended course; the other should be short, so that the vessel should not go too far from the intention, but adhere as much as may be practicable to the rhomb of her course.

32. To resolve a traverse, is to reduce and bring several courses into one; the courses are known by the compass, the distance by the log; while the dead reckoning they

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produce, is corrected by daily observation of the sun other planets, when opportunity offers.

33. The following is the method of taking the altitude by Hadley's Quadrant. Fix the screens a the horizon-glass, using either or both of them, acco to the strength of the sun's rays, by turning one or of the frames of those glasses close against the pla face of the instrument; then your face being tu towards the sun, hold the quadrant by the braces, o either radius, as is found most convenient, so as to l a vertical position, with the arch downwards.

34. Put the eye close to the right hand hole in vane, look at the horizon through the transparent pa the horizon-glass; at the same time sliding the i with the left hand, till the image of the sun, seen in quicksilvered part, falls in with the edge of the hori taking either the upper or the under edge of the visage.

35. Swing your body gently from side to side; when the edge of the sun is observed not to cut, b touch the horizon like a tangent, the observation is m Then with the degrees on the arch, reckoning from end next your body, give the altitude of that edge o sun which was brought to the horizon.

36. If the lower edge was observed, then six minutes added to the said degree, gives the altitude o sun's centre; but if the upper edge was used, the six minutes must be substracted.

37. The foregoing observations embrace merely outlines of navigation; our limits will not admit of giving more. Those who wish to acquire a thor knowledge of this art, may find every necessary i mation on the subject in the system given by Bouditch.

SURVEYING.

SURVEYING as is generally understood, relates to the measurement of land; but it also implies the measuring of harbours, rivers, coasts, &c.

2. This art is of very ancient origin. It was first invented by the Egyptians. It has however been considerably improved in more modern times; and since the use of the magnetic needle, the courses and distances of the boundaries of land are ascertained by a process different from what was the ancient custom.

3. The art of surveying, however difficult its attainment may appear, is nevertheless to be comprised within a very few general rules.

4. The accuracy of the work must depend entirely on the instruments employed, the steadiness of the hand and eye of the operator, and the faithfully tracing of the given lines and angles on the paper designed to exhibit the tract of land under examination.

5. The following leading principles will give an insight into the mode of displaying the results, whatever may be the means employed for their computation.

6. First. We are to reject the actual curvature of our globe, in all land surveys; that is, where no currents of water, or the level of any fluid is under consideration; such curvature amounts to about eight inches in every mile, either of latitude or longitude. In short we consider the earth to be flat instead of spherical.

7. Secondly. We must carry in mind that every triangle is equal to half a parallelogram of equal base and altitude. Thirdly. That wherever there is a deviation from the horizontal, there will be a greater extent of surface displayed on a site than if the same were horizontal.

8. To illustrate this, let an orange be cut through in the middle, and the flat part of one half of it be placed upon a level table, it is evident that the round surface of

the half orange, will offer more surface than the flat se
that lies upon the table: but if it were required to
on the spherical surface, it would be found that no
houses, &c. could be raised thereon, than would stan
the flat section.

9. The reason of this is, that no more perpendic
can be raised on the one than the other. The greate
deviation from the horizontal, the more is the base di
ished.

10. Fourthly. The surveyor must recollect the
plains, of whatever extent or form, may be divided
triangles of various forms and dimensions, whose aggr
will amount to the measurement of the area thus p
tioned off.

11. The boundary lines of an irregular field, or
of land, are ascertained by the chain and compass.
chain used in surveying, is commonly sixty-six feet o
poles in length. It consists of one hundred equal
links.

12. The compass serves to give the courses, h
the degrees of a circle marked on it. The needle sus
ed on a pivot in the centre of the compass, represent
north and south line. Consequently the course is k
from the angle it makes with the needle.

13. By way of illustration, we will suppose that w
to survey a piece of land. After fixing the compass a
particular corner or boundary, and after having som
ject placed at a convenient distance, we first see
many degrees the angle makes with the needle, and
measure the distance of the course with the chain.

14. If for example the course be west of north
number of degrees less than ninety, say twenty-fou
grees, and the distance four chains and forty-six link
mark down in the field book, north twenty-four de
west, four chains and forty-six links, and then advan
the next corner from which the course may form an
south and west with the needle, a certain number o

es; say fifty-seven degrees and thirty minutes, and the tance seven chains and eighteen links.

15. Then we should enter in the field book for the cond course, south fifty-seven degrees thirty minutes est, seven chains and eighteen links. And in like man- r the other courses and distances are obtained.

16. After obtaining the courses and distances of a iece of land, a plan or draft of the same is drawn from e field notes, in order to ascertain the contents of what s been surveyed. This is called plotting.

17. The instruments employed in this operation are the ale, dividers and protractor. The scale is usually made f wood or brass, and is six or twelve inches in length. n one side of this instrument are ten lines divided into qual parts. And one of these parts is subdivided into ten ore equal parts.

18. The dividers or compasses are used in taking off he distances from the scale, as given in the field book.

19. The protractor is generally made of ivory, in the orm of a thin flat scale or ruler, of which one side is plain, excepting a small notch representing its exact centre, and corresponding with a line perpendicular to it on the op- posite edge marked ninety, dividing the instrument into two equal or similar parts.

20. The edges on three sides of the protractor are marked with one hundred and eighty degrees backwards and forwards; the centre point ninety being a right angle. Some protractors are made in the form of a semicircle. A plot of a piece of land is drawn from the field notes in the following manner.

21. First draw a meridian or north and south line. Make any part of this line the place of beginning; denot- ing the same by a small dot; to which apply the centre of the protractor, having the edge exactly even with the meridian. Then count off the number of degrees as given in the first course in the field notes.

22. Make a small impression on the paper opposite the number found on the protractor; then draw an indefi-

the half orange, will offer more surface than the flat section that lies upon the table: but if it were required to build on the spherical surface, it would be found that no more houses, &c. could be raised thereon, than would stand on the flat section.

9. The reason of this is, that no more perpendiculars can be raised on the one than the other. The greater the deviation from the horizontal, the more is the base diminished.

10. Fourthly. The surveyor must recollect that all plains, of whatever extent or form, may be divided into triangles of various forms and dimensions, whose aggregate will amount to the measurement of the area thus partitioned off.

11. The boundary lines of an irregular field, or piece of land, are ascertained by the chain and compass. The chain used in surveying, is commonly sixty-six feet or four poles in length. It consists of one hundred equal wire links.

12. The compass serves to give the courses, having the degrees of a circle marked on it. The needle suspended on a pivot in the centre of the compass, represents the north and south line. Consequently the course is known from the angle it makes with the needle.

13. By way of illustration, we will suppose that we are to survey a piece of land. After fixing the compass at any particular corner or boundary, and after having some object placed at a convenient distance, we first see how many degrees the angle makes with the needle, and then measure the distance of the course with the chain.

14. If for example the course be west of north, any number of degrees less than ninety, say twenty-four degrees, and the distance four chains and forty-six links, we mark down in the field book, north twenty-four degrees west, four chains and forty-six links, and then advance to the next corner from which the course may form an angle south and west with the needle, a certain number of de-

grees; say fifty-seven degrees and thirty minutes, and the distance seven chains and eighteen links.

15. Then we should enter in the field book for the second course, south fifty-seven degrees thirty minutes west, seven chains and eighteen links. And in like manner the other courses and distances are obtained.

16. After obtaining the courses and distances of a piece of land, a plan or draft of the same is drawn from the field notes, in order to ascertain the contents of what has been surveyed. This is called plotting.

17. The instruments employed in this operation are the scale, dividers and protractor. The scale is usually made of wood or brass, and is six or twelve inches in length. On one side of this instrument are ten lines divided into equal parts. And one of these parts is subdivided into ten more equal parts.

18. The dividers or compasses are used in taking off the distances from the scale, as given in the field book.

19. The protractor is generally made of ivory, in the form of a thin flat scale or ruler, of which one side is plain, excepting a small notch representing its exact centre, and corresponding with a line perpendicular to it on the opposite edge marked ninety, dividing the instrument into two equal or similar parts.

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21. First draw a meridian or north and south line. Make any part of this line the place of beginning; denoting the same by a small dot; to which apply the centre of the protractor, having the edge exactly even with the meridian. Then count off the number of degrees as given in the first course in the field notes.

22. Make a small impression on the paper opposite the number found on the protractor; then draw an indefi-

nite line from the place of beginning through this dot, or impression, and on this line lay off the distance from the scale.

23. Suppose the distance to be four chains and fifty-four links; then sitting one foot of the dividers at number four on the scale, and extending the other to number five of the subdivisions on the fourth horizontal line, gives four chains fifty-four links, the distance required.

24. Then lay off this distance on the last drawn line representing the course. At the extent of the distance laid off make a dot, through which draw a line parallel to the first meridian, from which lay off the course and distance as before, and continue the operation in like manner till all the courses and distances are laid down. If the work be right, the last distance will reach the place of beginning.

25. To find the area of an irregular piece of land, divide the plot into a suitable number of triangles. Multiply half of the longest side of each of these triangles by the distance from the angular point to the longest side, and add together the products of all the triangles, the amount will exhibit the number of chains and decimal parts of a chain.

26. Cut off the unit figure of the chain, and the remaining left hand figures represent the number of acres. Then multiply all the other figures by four, and cut off the same number as are multiplied, and it gives at the left hand the number of roods or quarters of acres. Next multiply by forty, and observing to point off the same number of figures as before, and it gives the number of poles or perches.

27. It may be necessary to observe that when the distance consists of a greater number of chains than are found on the scale, it must be divided by some suitable number; which number must be used as a multiplier in calculating the contents.

28. There is another very convenient and useful me-

thod of calculating the area of a piece of land by means of tables of latitude and departure, corresponding with every course and distance.

AGRICULTURE.

AGRICULTURE, or husbandry, is the art of cultivating or tilling the ground, so that it may produce in the greatest abundance and perfection, those vegetable productions which are necessary for the food, comfort and convenience of mankind.

2. In a country like the United States, where by far the greater part of the inhabitants are devoted to agricultural pursuits, it must be considered as an object that merits particular regard.

3. An art which exhibits the best means for administering to the wants and necessities of the human family, should form a part of the education of those whose future employments may be in any manner connected with its practical operations.

4. It is from the hand of agriculture, that manufactures and commerce, and indeed every other branch of industry receive their support. The cultivation of the earth may therefore be considered as the most useful and laudable of all pursuits.

5. Here as in some other countries, we have many examples of distinguished individuals, who have left the seat of power, the theatre of political action, and the splendour and opulence of cities, that they might enjoy the pleasure of cultivating their native fields.

6. In confirmation of this, it may be remarked that our illustrious countrymen who have filled the first office in the gift of the people, have invariably retired from the presidential chair to enjoy, in the decline of life, that tranquillity which is only found in rural retirement, amidst the innocent and pleasing pursuits of husbandry.

7. The United States, comprehending a variety of soils and climates, present as wide a field for agricultural inquiry and investigation, as it does for the practical operations of the plough.

8. But in the present epitome we can only furnish some general observations on this subject. The following strictures are selected from Kett's elements of useful knowledge. They afford a pleasing if not an instructive view of the present topic.

9. The pursuits of agriculture are connected with that love of country which may be called a universal passion. The charms of nature are there fully displayed, and every mind which is not debased by vicious refinements, or enslaved by irregular desires, is eager to enjoy them.

10. A principle so universally felt, has never failed to call forth the powers of genius; and writers of all ages have expatiated on rural scenes and occupations with the most lively satisfaction.

11. Every poet more especially claims the country as his peculiar province; from it he derives the most beautiful and striking descriptions, and is enabled to represent those various prospects of nature which are so highly gratifying to every ingenious mind.

12. But rural scenes and occupations, considered as conducive to the support and comforts of life, become far more important and useful objects of speculation, than merely as they please the eye by their beauty, or charm the fancy by the images which they present.

13. They lead to inquiries which are worthy the particular attention of every lover of his native country; inasmuch as they present to view the powers of art combined with those of nature, to improve the soil to the greatest degree of fertility; and thus minister to the substance, the increase and happiness of mankind.

14. Agriculture is not only essential to the well being of society, in a rude and unpolished state, but is equally requisite in every stage of its refinement. As an incitement to its constant and uniform pursuit, it repays the

exertions of the husbandman with regular and abundant returns.

15. From the remotest ages it has been esteemed worthy of general attention. The simplicity of ancient manners rendered it an object not inconsistent with the rank and situation of persons of the greatest eminence.

16. Gideon, the renowned champion and judge of Israel, quitted the threshing-floor to preside in the public assembly of his countrymen; and Cincinnatus, the conqueror of the Volsci, left his plough to lead the Roman armies to battle; afterwards declined the reward gained by his victories, to return to his native fields.

17. And in modern times this occupation has been held in no less esteem. There are not wanting those amongst the English nobility, who take a lively interest in all rural improvements, and preside at the annual meetings of agriculturists, with no less reputation to themselves than beneficial to the art.

18. Washington, the late celebrated president of the United States of America, found the most pleasing relaxation of public cares in the superintendence of his own estate.

19. The emperor of China, at the beginning of every spring, goes to plough in person, attended by the princes and grandees of his empire; he celebrates the close of the harvest among his subjects, and creates the best farmer in his dominion a mandarine.

20. An art like this, which from its obvious utility must necessarily claim not only the patronage of the great, but the general attention of mankind in proportion as they are civilized, has been not less distinguished as a subject to exercise the talents of eminent authors.

21. In various ages many have written to explain its principles and celebrate its excellence. Some have adorned it with the elegance of fancy, and others have methodized it with the precision of rules.

22. Hesiod was one of the earliest of the Grecian poets, to sing the praises of the plough, and in a work

nearly coeval with the Iliad itself, has combined with the principles of the art, many curious observations on the seasons most propitious to its various employments.

23. At a period of society when its advantages were better understood, and its practice more generally diffused, Xenophon expatiated in his economics on the importance of agriculture, and describes its influence on the prosperity of the arts and the advancement of civilization.

24. Virgil has described at large the rural occupations of his countrymen, the cultivation of the land, the season most favourable for tillage, and the nature of grazing and planting.

25. He has adorned every branch of his subject with refined and striking beauties of composition; and has so fully collected the best observations and choicest maxims of antiquity, as to render it almost a superfluous task to consult the works of other authors, relative to the progress which his predecessors had made in this subject.

BOTANY.

The study of botany is not only an elegant amusement that leads to a beautiful display of the order and variety established by nature, but from the different and important uses of plants in food, raiment, medicine, and many arts, it is of real service to mankind.

2. The range of botany is wide and extensive; from the small moss and fringe which are intermixed with the common grass, to the towering fir and majestic oak.

3. The various kinds of grass which cover the earth; flowers of all hues and forms, which exhale the most fragrant odours; beautiful shrubs and stately trees are all subjects to the dominions of Flora.

4. Linnæus, the celebrated naturalist, has divided the inhabitants of the vegetable world into twenty-four classes;

and these classes into about one hundred and twenty orders; these contain about two thousand families, or genera; and these families about two thousand species; besides innumerable varieties which the accidents of climate or cultivation have added to these species.

5. This number of plants must be exceedingly deficient if we consider how little is known of the vegetable productions of the globe. We are very slightly acquainted with the interior parts of Africa, with the three Arabias and the innumerable islands of the Southern Ocean.

6. What have we ascertained in the immense Archipelagos of the Phillipines and Moluccas, or of most of the Asiatic islands? The vast coast of New Holland and the island of Otaheite are said to have a botany peculiar to themselves.

7. Another Flora there of bolder hues,
And richer sweets beyond our garden's pride
Play o'er the fields, and showers with sudden hand
Exuberant spring. *Thompson.*

8. Every perfect plant consists of a root, trunk, leaves, props, fructification and inflorescence. The root has two parts, the caudix and the radical. The caudix, or stump, is the body of the root, from which the trunk or branches ascend, and the fibrous parts descend; and according to the nature of the plant, is either solid as in trees, bulbous as in tulips, or tuberose, as in piony.

9. The radical, or little root, is the fibrous part of the main root, which descending from it, enables it to draw nourishment from the earth, for the support of the plant. The trunk is that part which rises immediately from the root, and supports the branches, leaves, flowers and fruit.

10. A caulis or stem is likewise the proper trunk of a plant. It is said to be simple when it does not divide and compound when it parts into branches. A culmus or straw is the proper stem of grasses. Fulcra or props express those small parts of plants, of which the chief use is to

strengthen and support them. Those that serve as the foot-stalks to the flowers are called peduncles.

11. INFLORESCENCE. Inflorescence signifies the manner in which flowers are joined to their several peduncles or foot-stalks. It admits of several varieties; all distinguished by appropriate names, according to the structure, disposition and circumstances of the parts.

12 These distinctions are eight in number. First, *verticellate*; when the flowers are placed in whorls round the common stalk. Second, *capitulate;* when many flowers are collected into nearly a globular form or head, upon the summit of a common stalk, either with or without partial peduncles.

13. Third, *spicate*; when the flowers having no partial peduncles are ranged in spikes alternately round a common simple peduncle. Fourth, *corymbate;* when the lesser peduncles of the flowers produced from different parts of the common peduncle in clusters, which though of unequal length, and single or branched, form a regular surface at the top.

14. Fifth, *thyrsate;* which expresses a mode of flowering resembling that of pines. Sixth, *parriculate;* when the flowers are dispersed among the peduncles, variously subdivided, as is common in grasses. Seventh, *axillarate;* when the flowers proceed from the angle formed by the leaf and stem, as is most commonly the case. Eighth, *terminalate;* when the flowers terminate the stalk or branch.

15. FRUCTIFICATION is a term used to signify the flower and fruit of a plant, which, though not present at the same time, cannot well be separated. The parts of fructification are seven in number. As they are the same in all parts of the world where vegetables grow, a classification derived from them affords a kind of universal language to botanists.

16. The First part is the calyx, impalement, or flower cup. Second, the corolla, foliation, or leaves of the flower. Third, the stamina, consisting of small threads called stamens. Fourth, the pistulum, or threads in the centre of the flower, called pistils. Fifth, the paricarpium, or seed

vessel. Sixth, the samina or seeds themselves. Seventh, the receptacle, or base on which fructification is seated. The four first are properly parts of the flower, and the three last parts of the fruit.

17. *The calyx* is the termination of the outward bark of a plant. Its chief use consists in enclosing, supporting and protecting the other parts of fructification. When situated close to the blossom and partly enclosing it, it is called a flower cup. When proceeding from one common receptacle like the chaff of an ear of wheat, it is called a catkin.

18. When it bursts lengthwise and puts forth a flower stalk it is called a spatha or sheath. It is a gluma or husk, as in grasses which it folds over with its valves. It is a veil, as in the mosses, where it is placed over the other parts of fructification.

19. *The corolla* is the termination of the inner bark of a plant, appearing in the new form of painted or coloured leaves, usually called the blossom or flower. It is generally seated on the receptacle, though sometimes on the calyx, serving as an interior guard to the parts which it incloses. Its leaves are called petals; and if it consists of but one piece it is said to be monopetalous; if of two, diptalous; if three, trepetalous, and so on according to the number of petals.

20. The corolla is also distinguished by the division and shape of its leaves. The nectary containing the honey on which bees and other insects feed, belongs to the corolla. This last appendage has various forms.

21. *The stamens* are the threads within a flower, having heads called anthers; the slender thread shaped part of the stamen; which serves as a foot stalk to elevate the anthers, is termed the filament. The stamens are defined by Linnæus as being the entails of the plant, designed for the preparation of the fructifying dust called pollen. This meal or dust may be observed on the anthers, or heads of the stamens. The classes of vegetables are

chiefly distinguished by the number and situations of the stamens.

22. *The pistils* are the threads situated in the centre of the flower amidst the stamens; they proceed immediately from the pith of the plant. Each of the pistils consists of three parts. The thickest part, at the bottom, is called the germ or seed bud, containing the rudiments of the young fruit or seed.

23. The stigma is the top or summit of the pistil, and the style is that part which, standing on the germ, serves to elevate the stigma, or highest part of the pistil, in order to receive the dust of the stamens, and convey it to the germ, as through a tube. The most of the orders belonging to the different classes are distinguished by the number and situation of the pistils.

24. *The pericarpium*, or seed vessel, is the germen or germ grown to maturity. It is situated at the receptacle of the flower. All plants, however, are not furnished with a seed vessel; and in some it is supplied by the calyx, which converging, incloses the seeds till they arrive to maturity; sometimes the receptacle, and sometimes the nectary, performs the office of seed vessel.

25. The pericarpium is extremely various, being pulpy in apples and pears, fleshy in plums and cherries, hard in nuts, and juicy, as in the gooseberry and cherry. Consequently the fruits which afford us so many luxuries are nothing more than paracarps.

26. *The Semina* or seeds are the essence of every vegetable, containing the rudiments of the future plant. They are distinguished according to number, shape, texture, and various other circumstances. The part of the seed which contains the future plant, is the germ, vulgarly called the eye; no seed being capable of vegetating if this be defective.

27. *The receptacle* is the common base which supports and connects the other parts of fructification. A proper receptacle is when it supports a single flower. A receptacle of the fruit, when it is the base of the fruit only, de-

ched from the receptacle of the flower. And a recep-
cle of the seed when it is the base that fastens the seed
ithin the pericarpium.

28. According to Linnæus, the essence of a plant con-
ıts in the fructification; the essence of fructification in
e flower and fruit; the essence of the flower in the
ıthers and stigma, and the essence of the fruit in the
ed. Hence, he considers the fruit and flower as the
undation of his generic distinctions.

29. CLASSIFICATION OF VEGETABLES. Agreeable to the
xual system, which is almost universally adopted, vegeta-
es are divided into twenty-four classes; comprehending the
ırious orders, genera, and species of the vegetable king-
)m. A class has been very justly represented as bear-
g some resemblance to an army, an order to a regiment,
genus to a company, and a species to a soldier.

30. The names of the classes are derived from the
reek, each of which expresses something peculiar to the
lass. The first twelve are taken from the Greek numerals
nd the word *andria*, referring to the number of their sta-
ıens. The thirteenth is distinguished by the situation of
ıe stamens.

31. The fourteenth and fifteenth are founded on the
roportion of the stamens. The next five classes on the
onnexion of the stamens. From the twentieth to the
wenty-third inclusive, they are formed from the situation
f the stamens. The twenty-fourth consists of plants
hose parts of fructification are less accurately known.

32. The following are the names of the classes, with
ıe number of orders comprehended under each:—Monan-
ria, two orders; Diandria, three; Triandria, three; Te-
andria, three; Pentandria, six; Hexandria, five; Hep-
andria, four; Octandria, four; Enneandria, three; De-
andria, five; Dodecandria, five; Icosandria, five; Polyan-
ria, seven; Didynamia, two; Tetradynamia, two; Mona-
elphia, eight; Diadelphia, four; Polyadelphia, three; Syn-
enesia, six; Gynandria, eight; Monoecia, eleven; Dioecia,
)urteen; Palygamia, three; Cryptogamia, four orders.

33. All plants with only one stamen are of the *first*

class; those with two are of the *second;* those with three are of the *third;* and so on, to the *tenth.* In the eleventh class each flower contains from 12 to 19 stamens. In the twelfth, there are 20 or more stamens in each flower, inserted in the calyx or flower-cup; as is the case with the cherry and strawberry.

34. Plants of the *thirteenth* class have upwards of 20 stamens, like those of the twelfth, but differ materially from having them inserted in the receptacle, or base of the flower; as the poppy and anemone.

35. The *fourteenth* class is distinguished by having four stamens; two short and two long ones; as in the dead nettle and snap-dragons.

36. In the *fifteenth* class, the flowers have six stamens, four long and two short; as in the radish and wall-flower.

37. The *sixteenth* class is characterized by the stamens being united together by a thin filament, forming a little tube round the pistil; as in the passion-flower and geranium.

38. In the flowers of the *seventeenth,* the stamens are united by their filaments into two parcels or sets, which sometimes cohere together at the base; as in the pea and kidney bean. The *eighteenth* class contains those plants in which the stamens are united in more than two parcels; as in the citron and orange trees.

39. In the *nineteenth* class the stamens are united by their anthers into a tube, but the filaments are separate; as in the sun-flower, daisy, and dandalion. The *twentieth* class may be known from the stamens growing out of the pistil itself; as is the case with the orchies and ladies-slipper.

40. The *twenty-first* class comprehends plants in which the stamens and pistils grow on separate flowers, but on the same plant: as the oak, hazel, and fir. In the *twenty-second* class the stamens and pistils grow not only on separate flowers, but on separate plants; as in the hop, willow, and yew.

41. In the *twenty-third* class, the plants have three

flowers; some of which have pistils only, some only, and others stamens and pistils in the same
To the *twenty-fourth* class belong plants in which ers are unknown, or not visible to the naked eye; , mosses, mushrooms, and sea-weed.

ORDERS. The orders belonging to the first thirteen are distinguished solely from the number of pistils flower. The names of the orders, like those of ses, are formed from the Greek numerals, but with tion of the word *gynia*, instead of *andria*.

When a plant has but one pistil it is said to be in agynia order; when it has two, in the diagynia; riagynia; four, tetragynia; five pentagynia, and the polygynia order, which contains many pistils.

To the first order of the fourteenth class belong with naked seeds at the bottom of the calyx; as and mint. To the second, plants in which they osed in a seed vessel. The two orders of the fif- lass are distinguished by the form of the fruit. t having broad short pods, and the second con- f plants with long ones.

The orders of the sixteenth, seventeenth, eigh- and twentieth classes are characterized by the of stamens in each flower. The five orders of teenth class are variously distinguished.* Those wenty-first are taken partly from the number of , and partly from the names and characters of the classes.

The orders of the twenty-second class are founded number, union, and situation of the stamens. f the twenty-third are taken from classical cha-

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ie first order the floret is perfect, containing stamens and d those of the margin pistils only. 3. The florets of the fect, but those of the margin destitute of style and stamens. of the centre have stamens only, and those of the margin y. 5. Such as have tubelar florets, all perfect, each having parate calyx in addition to the general calyx.

racters. The four orders of the twenty-fourth cl natural orders, comprehending ferns, mosses, mus and flags.

47. PROPERTIES AND USE OF PLANTS.—While bles clothe the earth with rich and variegated beau display the exquisite workmanship of Deity in th formation; they serve as the indispensable support and animals. They furnish not only food, but m

48. We are indebted to the vegetable kingdom terials for building houses, ships, carriages, and rious implements of human industry; for dying, fo ing; for raiment; for commerce, for pleasure, and fi ment.

49. *Monandria class.* The plants belonging to class, containing but one stamen in each flower, few in number. They are chiefly found in tropica tries. From such as belong to this class, the mar phire, Indian arrow-root, tumeric, and ginger, selected as specimens. The marsh-samphire, o wort, is usually found in marshes near the sea. Th of which is useful in the manufacture of glass and

50. The arrow-root affords a mild and agreeabl cine. The root of the turmeric is employed i yellow. The ginger is a native of the East Indies, be raised in perfection in the Southern States. It a round stalk about four feet high. The roots of when reduced to powder, are employed in pastry, a kinds of cookery.

51. *Diandria class.* Plants of this class are disti ed by having two stamens in each flower. Amongs may be noticed the pepper-bearing plants of the E West Indies; the olive from which oil is extract common lilac, that perfumes the air in summer ev the rosemary, jessamine, and sage; the privet, butt and brook-lime; the last of which may serve as an i tion of the class.

52. The brook-lime is very common in ditches a low streams; the stem is jointed, and about a foot in

leaves are oval, of a pale green colour, and growing out of the stem in pairs; the flowers, which rise in bunches from the base of the leaves, are of a faint blue colour, divided into four small round petals. There is but one pistil in each flower; the plant is, therefore, in the monogynia order.

58. *Triandria class.* Plants of the third class are distinguished by having three stamens in each flower. Plants which furnish food for men and a great number of animals, belong to this class, which includes the various grasses. From the seed of some of these we receive our bread; as from wheat, rye, barley, oats, and millet.

54. From these also various malt liquors are made. They furnish not only food, but a wholesome beverage to a great portion of the human family. The sugar-cane, whose nutritious juice is so well known, belongs to this class. Not one species of this large and numerous tribe is poisonous.

55. A description of the wild valerian may serve to exemplify the class. It commonly grows about woods and hedges; flowers in June, and rises to the height of from two to four feet. The stalk is smooth, upright, and branching; the leaves on the stem are placed in pairs, upon short broad sheaths; the flowers are small, of a white purplish colour, which appear in large bunches at the termination of the stem.

56. *Tetrandria class.* Plants of this class have four stamens of equal length in each flower, they are neither noxious nor hurtful; many of them are used as pot-herbs, amongst which may be noticed mustard, scurvy grass, and horse-radish. In this class is found the madder, teasel, and holly; the root of the madder yields a beautiful scarlet dye.

57. The heads of the teasel are armed with sharp slender bristles, which are used by clothiers for raising the knap on cloth. The holly is a well known evergreen of singular beauty, with shining prickly leaves, and white flowers, which grow in clusters round the branches, and

are succeeded by berries of a bright scarlet colour, containing four very hard seeds.

58. *Pentandria class.* Plants whose flowers have five stamens belonging to this class. This is the most numerous of all the classes, as it comprehends more than one-tenth of all the plants at present known. Many of them are poisonous, amongst which, the deadly night-shade may be noticed as a specimen; being highly poisonous in all its parts.

59. The deadly night-shade grows in woods and on shady waste grounds. It is from three to five feet high; the whole plant is covered with fine hair, and the leaves are of an oval shape, standing in pairs on short foot stalks. Its flowers are bell-shaped and of a dark purple colour.—It produces small shining black berries, which are ripe in September.

60. Amongst the other plants of a similar character, may be mentioned the winter-cherry, mad-apple, mullein, hand-bane and tobacco; even the potatoe, which affords so valuable a food, partakes of the general character in some of its parts.

61. In the fifth class may be seen the primrose, cowslip, violet, polyanthus and honey-suckle; besides parsley, hemlock and fennel and other umbelliferous plants, which send out from the upper parts of the stem, as from a centre, a number of supports, which spread like the spokes of an umbrella, crown the stem with a great number of small flowers: and in the compound umble, each spoke bears a little umble at its end; hence they are called umbelliferous. To this class also belongs the currant and gooseberry shrubs, and the common flax, so elegant and useful. The creeping and ornamental ivy, the vine, the elder, and the coffee tree.

62. *Hexandria class.* To this class, comprehending the plants that have six stamens in each flower, belongs a very beautiful assemblage, which either delight the eye with their varied hues, or sweeten the air with their fragrance.

63. Amongst the plants of this class, may be seen the modest snow drop, the delightful amaryilis, the fragrant lily, the gaudy tulip, the narcissus, hyacinth, the golden crocus and a variety of pleasing exotics.

64. The most useful plants of this class may be noticed the rice, a grass with six stamens, cultivated in many parts of the world as a primary article of food. The curious barberry, the delicious pine apple, the asparagus, garlic and sorrel belong to this class.

65. The lily having all its parts very distinct, may be described as a specimen. It usually rises about three feet in height, with long narrow pointed leaves, irregularly scattered over the stem; the flower has no calyx; and the corolla is bell-shaped, consisting of six petals, within which are the stamens and one pistil, furnished with a long triangular stigma.

66. *Heptandria class.* There are fewer plants belonging to this class than any other: amongst which may be selected the winter-green and horse-chesnut. A botanical description of the latter may serve to exemplify the class.

67. The horse-chesnut is one of Flora's superb ornaments: it bears clusters of flowers in the form of pyramids, which have a beautiful appearance. The calyx is tubelar, and divided into five short segments: the corolla consists of five petals, inserted in the calyx by narrow claws, and is of a fine white colour, irregularly spotted with red and yellow. It contains seven stamens; the filaments of which are tapering, about the length of the corolla and furnished with pointed anthers: its single pistil places it in the monogynia order.

68. *Octandria class.* This class is distinguished by plants whose flowers have eight stamens: from which may be selected the yellow wort or centaury; the whortleberry shrub, the balm of Gilead tree, so valuable in medicine, the rose-wood tree, used for ornamental purposes, the beautiful nosturtium and the numerous genus of heaths.

69. The maple and sycamore trees have been by botanists removed to this class, from the twenty- The sugar maple is very valuable to the inhabita this country, who make large quantities of sugar fro sap, which they obtain in the spring, by piercin trunk of the tree. The beautiful mezereon shrub, Flora's earliest and most brilliant productions, belo this class.

70. *Enneandria class.* Plants of the ninth cla known by their flowers having nine stamens; of the flowering rush, which grows on the margin of and slow running streams, may serve as a specimen

71. The flowering rush rises from the water w round smooth stalk, from two to five feet high; at t is a head of rose-coloured flowers, each of which is posed of six petals, hollowed out like a bowl, and t them smaller than the rest. This plant is in the gynia order, from its having six pistils.

72. To this class belong many plants which valuable medicines; the principal of which are can cassia, the sassafras, and rhubarb. The camphor gum of a tree of large growth in Japan. The bay-t laurel, with which the ancients crowned their vict generals, belongs to this class.

73. *Decandria class.* The tenth class compre all the plants whose flowers have ten stamens. T class belong a great assemblage of fine plants and fl amongst which is the pink or carnation tribe. I class may also be seen the garden rue; the common weed; the stone-crop, yellow succulent plants grow walls and roofs; the silene, or catch-fly, which its name from its entrapping flies with its clammy tions.

74. Amongst the trees of this class may be notic mahogany, which grows to a large size in the tr parts of America; the lignumvitæ, a large tree gr in the West Indies, the wood of which is very ha valuable, and so heavy as to sink in water; the lo

tree, which grows to the greatest perfection at Campeachy, and the bay of Honduras, and is employed in dying; the Brazil wood, which is used in giving a beautiful scarlet colour to cloth, and which is wrought into many elegant articles of furniture, belong to this class.

75. *Dodecandria class.*—The eleventh class consists of plants having flowers with from twelve to nineteen stamens in each. In this class are found the purple loose-stripe, common on the banks of rivers, the common agrimony weld and house leek, the last of which may serve as an example.

76. The common house-leek is a small evergreen that grows in clusters on the roofs of cottages and the tops of old walls; the leaves adhere to the plants in thick tufts; they are of a fleshy nature, and are fringed at the edge with hair; the calyx is divided into twelve parts; the corolla consists of twelve or more petals; it has twelve pistils, and is therefore in the dodecagynia order.

77. Weld, or dyer's weed, is much used in dying woolen, silk and cotton of a beautiful colour; its flower has been observed to follow the course of the sun, turning towards the east at sun-rise, and towards the west at its setting; and facing towards the north at midnight.

78. *Icosandria class.* To the twelfth class belong plants which have 20 or more stamens inserted in the calyx. It is from this class we receive the most of the pulpy fruits which are esculent and wholesome; such as the apple, pear, peach, plum, medlar, cherry, and their different varieties; besides a pleasing assemblage of shrubs and herbs, as the raspberry, strawberry, the rose, the sweet briar, and the bramble.

79. To this class also belong, the almond, the clove tree, the laurel, and the myrtle. The almond tree rises from 12 to 16 feet high, with long pointed leaves of a bright green colour. The fruit consists of a tough hairy substance, within which is the thick rough shell that contains the kernel. The clove tree is a native of the East Indies, and its general appearance resembles the laurel.

80. The part used is the unexpanded flowers calices, which acquire their dark brown colour from smoke by which they are dried, in order to preserve aromatic qualities. The plant that produces berries pimento, or all-spice, is a species of the myrtle gr in tropical climates. No plant belonging to this cl poisonous;* some, however, have deleterious leaves.

81. *Polyandria class.* The thirteenth class is d guished by having from 20 to 1000 stamens, risin mediately from the receptacle. If the flower hav calyx at all, it consists of two or more leaves generally fall off as the blossom opens. Most o plants belonging to this class are poisonous; am which may be noticed wolf's-bane, columbines, lark piony, marsh, marygold, hellebore, and water-lily.

82. To this class belongs the poppy, and those bri ornaments of the parterre, the ranunculus and the mone. Among the trees and shrubs of this class, m noticed the caper-bush, the lime, the nutmeg, an tea-trees; the last of which furnishes an article of siderable commerce. The tea-tree is principally duced in China and Japan. It is an evergreen att to the height of from six to ten feet, much branched covered with a rough dark gray bark. The leaves are the only valuable part, are narrow and tapering about an inch and a half in length.

83. *Didynamia Class.*—Plants of this class ar tinguished by having four stamens of unequal length long and two short ones; they are farther charact by the shape of the flower, the corolla being of that which is called ringust, or gaping, from its resemb to an open mouth; of which the common white nettle may serve as a specimen.

84. The flowers of the dead-nettle are insert

* A celebrated botanist has observed, that no traveller, in th unknown wilderness, need be afraid to eat the fruit of any plant stamens grow upon the calyx.

whorls, or sets: each corolla is of one piece, of a tubelar shape, and divided at the top into two lips, the upper is called the helmet, and the lower one the beard. By lifting up the helmet, four stamens, in two pairs, and of a dark colour, may be seen, and in the midst of them is a forked style, which remains fixed to the receptacle, when the stamens are pulled off with the corolla.

85. There is no plant belonging to this class poisonous or hurtful. The Syrian marum is the most fragrant of plants. Marjoram, pennyroyal, mint, lavendar, rosemary and sage are highly fragrant, and useful in nervous disorders. There are but few trees belonging to the fourteenth class. The most remarkable of which is the calabash tree that grows in the West Indies, and produces fruit so large that the shell of it is capable of holding six quarts of water. It being of a hard substance is often converted into bowls and dishes.

86. *Tetradynamia class.* This class comprehends plants whose flowers have four long and two short stamens. Plants of this class are neither noxious nor hurtful. Many of them are esculent and wholesome; some of which are used as pot-herbs, as the cabbage and turnip. With the plants of this class may be mentioned the radish, scurvy-grass, mustard, the sweet scented wall-flower, and wead; the last mentioned is extensively used in dying woolen cloth a fine blue colour. It is said to be the plant with which the ancient Britons painted their bodies to give them a bluish appearance, and a more dreadful aspect in battle.

87. To this class belong most of the plants which contain their seeds in pods; of which the wall-flower may be described as a specimen. It has a calyx of four spear shaped leaves, and a corolla of four petals, of a roundish form, fastened to the receptacle by a claw as long as the calyx; the divided summit of the pistil, and four of the stamens, are visible in the unopened flower, but the two shorter ones remain concealed within the calyx.

88. *Monadelphia class.* In the sixteenth class the sta-

mens are combined by their filaments into one t
common base. The characters of this class may b
served in the common mallow, the holly-hock, the
and beautiful family of geraniums, the passion-fl
and the hibiscus.

89. The most valuable plant belonging to this cl
the cotton, extensively cultivated in the southern s
of the United States. The seed vessel containing a
downy substance, which is manufactured into
Nankin is a species of cotton peculiar to a provin
China, of which Nankin is the capital. This class
tains no poisonous plants. A description of the co
mallow may serve to exemplify the class.

90. The mallow rises from one to three feet high;
a rough, upright, and branching stem, and hairy l
with five or seven divisions, unequally notched nea
edge, and a purplish stain near the stalk. The fl
are large, consisting of five heart-shaped petals, of a
ple colour, streaked with veins of a deeper hue; the
is double; the middle of the receptacle rises like a
pillar, supporting numerous stamens.

91. *Diadelphia class.* The seventeenth class co
of plants in which the stamens are united by thei
ments into two parcels or sets, for the most part i
equal numbers. The flowers of this class are all
same form. They are said to be butterfly-shaped,
a fanciful relation they bear to the form of a but
Among plants of this class are peas, beans, vetches,
wort, and clover; from which the pea may be selecte
specimen.

92. The flower of this plant consists of five p
the largest of which, when turned upwards, is calle
standard; the two side pieces, resembling each othe
the wings, below which is seen a greenish white
called on account of its form, the keel, or boat. On
ing the keel gently downwards, is seen the ger
element of the pea pod, surrounded by a cylindrical
brane, which terminates in ten distinct stamens, fo

as it were an exterior armour about the germ, to defend it from rain and other injuries.

93. To this class belong the indigo plant, from which a permanent and beautiful blue dye is obtained; the liquorice so useful in medicine; the acacia-tree; the laburnum, and other ornaments of the shrubbery.

94. *Polyadelphia class.* In the flowers of plants belonging to the eighteenth class, the stamens are collected into more than two parcels or sets, each united at the bottom by the filaments. This class contains but few plants; among the most interesting are the chocolate nut-tree, the orange, the lemon, and the citron trees. The two last are beautiful evergreens. The orange tree affords a delicious fruit, the juice of which is of considerable use in fevers and inflammatory disorders. It is also of considerable efficacy in preventing and curing the scurvy. The lemon possesses similar medical virtues with the orange, but its aid is much stronger.

95. The tustan, which grows in woods and damp uncultivated grounds, may serve as an example of this class. It bears flowers of a rich yellow colour, on a shrub-like stem, about a foot and a half in height; the calyx is placed below the germen, and consists of five acute leaves; the petals are also five in number, and of an irregular oval shape; the seed vessel is a small pulpy berry, which when ripe is of a purplish black colour.

96. *Singenesia Class.* Plants of the nineteenth class are distinguished by having compound flowers, consisting of many distinct florets on one common receptacle.—Plants of this class are very common and numerous. Many of them are bitter, and useful in medicine; amongst which we find the colt's-foot, leopard's-bane, viper's-grass, dandalion, wormwood, tansey, garden marygold, chamomile, daisy, thistle, and hawk-weed.

97. To this class belong a few poisonous plants, of which may be noticed the wild lettuce, with a milky juice, the sallaw-flower, and leopard's-bane. To the nineteenth class belong the sun-flower, the scarlet cardinal flower,

the common artichoke, and the Jerusalem artich the last of which produces tuberous roots, similar to tatoes.

98. A botanical description of the common daisy serve to exemplify this class. The daisy, from its p liar structure, is very interesting; all those appa white and pink petals, are in reality true flowers; every one of those yellow shoots in the middle is a flower also.

99. On examining one of the interior white pe there appears a long white part tipped with red, an the lower end, by which it is fastened, appears a l tube that contains a thread ending in two horns, w are the forked summit of the pistil.

100. Each of these beautiful little florets, when panded, has a corolla shaped like that of the lily, five stamens, which are united in the form of a tube, surround a pistil that passes through them, and is fo at the summit. The whole of the florets are conta in a calyx composed of two rows of leaves, and s upon a common receptacle, which is formed like a s loaf; there is no seed-vessel, but the little oval seeds placed immediately below the yellow florets, and w these fall off, naked seeds remain attached to the ceptacle.

101. *Gynandria class.* The flowers of the twent class are formed in a peculiar manner. In this class stamens grow upon the pistil itself. To this division long the beautiful tribes of flowers, the orchis and orph the ladies' slipper, and the birthwort with a shea flower.

102. In this class the purple orches may be exam as a specimen. The stalk rises about a foot in hei and is purplish towards the top; the leaves are long, usually marked with dark coloured spots; and the flo terminates the stem in a long regular spike.

106. The corolla of the orchis is composed of five tals, two of which are upright, of an oval pointed sh

ith their lips bent inwards, and the other three are aced above it, so as to form the helmet; the lip is large and vided into three lobes; the nectary is lengthened out be- nd in a tubelar form. Its two short filaments are in- rted in the germen, and the anthers are curiously incas- d in the limb of the nectary.

104. *Monoecia class.* The twenty-first class is com- sed of plants having stamens and pistils in separate owers, but both growing on the same plant. The mo- oecia class consists of many curious and important plants. n this class we find the cucumber, melon, and others of e gourd tribe; the stinging-nettle, sedge, bull-rush, aize, or Indian corn. The last mentioned is the most aluable of the American plants, the stalk of which is inted like the sugar cane; it bears large ears containing e seeds in naked rows.

105. Some of our most valuable trees belong to this lass; as the oak, pine, birch, beach, box, mulberry, and walnut. The stamens of the oak, as well as several other trees of this class are on a katkin, a sort of spike compos- ed of flowers and chaff; and the pistils are sitting in buds attached to the branches.

106. There is a numerous family of oaks. The hard- est and most durable is the live oak, an evergreen that grows to an enormous size in the southern part of the United States. To the monoecia class belong the cocoa- nut tree, the bread-fruit tree, the siphonia or Indian-rub- ber tree, and the tallow tree.

107. The cocoa-nut tree is found in the East and West Indies. It rises to the height of seventy feet, and makes a very interesting appearance, the tops of the stems being crowned with tufts of leaves from ten to fifteen feet long, bearing clusters of nuts nearly as large as a man's head.

108. The bread-fruit tree is a native of several of the islands in the Pacific ocean. Its fruit is something less than the cocoa-nut. It supplies the inhabitants of those islands with an abundance of wholesome food during the

greatest part of the year. The Indian rubber is an resin that oozes from incisions made in the siphon

109. Its tenacity is such that the Indians of America make boots of it, which water cannot pe and which, when smoked, have the appearance leather. The tallow-tree grows in China, and i the height of a common cherry tree; it produces from which a green wax is obtained, which is son manufactured into candles.

110. *Dioeca class.*—In the twenty-second cl stamens and pistils are in separate flowers, situ separate plants of the same family, as may be seer yew, which possesses the best flowers to illustr class. Amongst the plants of the dioeca class v notice the hop, spinach, hemp, juniper, willows, and the misletoe.

111. The hop is cultivated for giving an ag bitter to malt liquor; the part used is a sort of which contains the flowers that have pistils. The is an evergreen prickly shrub, from the berries of the well-known spirituous liquor called gin is prep

112. The misletoe is a parasitical evergreen growing on the trunk and branches of trees. It v take root in the ground, but if its ripe berries be into the apertures of almost any tree, they will p the plant the following year. The hemp is a v plant; it seems to have been a native of India, but cultivated in various parts of the world.

113. *Polygamia class.*—The character of the t third class is distinguished by the plants having flowers with stamens only, others with pistils onl others with all their parts perfect. The most v plants of this class are the fig-tree, the plantain, a acacia. To this class belong the mimosa, or se plant.

114. The fig-tree has no apparent flowers, but t in its early stage has the inner surface covered wit florets, which can only be discovered by opening it.

fig-tree with all its varieties grows to great perfection in the Southern states.

115. The plantain tree grows in the West India islands, and is one of the greatest of blessings to the negro slaves. The stalk rises to about twenty feet, with leaves at the top eight or ten feet long, very thin and tender. The fruit of the plantain is a good substitute for bread, and is used as such by the negroes.

117. The acacia tree grows in Arabia; from which the gum arabic is obtained. The sensitive plant is a native of Brazil, but may now be often seen as an interesting inhabitant of our garden flower beds.

118. *Cryptogamy class.* The twenty-fourth and last class of the Linnæan system, comprehends all plants whose flowers are not known or not capable of being numbered with any precision. To this class belong the ferns, flags, mosses, and mushrooms.

119. Ferns are very common about the borders of woods, near rivulets; the leaves are shaped like the end of a lance, and divided into many lobes or second leaves. What is called the fructification or seed vessels of ferns, are generally disposed in spots, or parallel lines at the back of the leaf.

120. To the family of flags belong many marine plants, some of which have no roots, but float about upon the water. Mosses are found in all climates. Their structure is curious and beautiful, but too minute to be observed without the aid of a magnifying glass.

121. Mushrooms are a singular tribe of plants, without branches, leaves or flowers, and scarcely any root, their substance is fleshy, of a quick growth and of short duration; to this class belong the lichens, or liverworts, of a fleshy or leather-like substance, growing on rocks, trees and old buildings. From some of the lichens, a fine purple colour is obtained. The most of what belongs to the cryptogamia class are dangerous or suspected plants. Some of the mushrooms are esculent, and a few of the lichens and ferns are used in medicine.

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110. *Dioeca class.*—In the twenty-second class the stamens and pistils are in separate flowers, situated on separate plants of the same family, as may be seen in the yew, which possesses the best flowers to illustrate the class. Amongst the plants of the dioeca class we may notice the hop, spinach, hemp, juniper, willows, poplar, and the misletoe.

111. The hop is cultivated for giving an agreeable bitter to malt liquor; the part used is a sort of catkin which contains the flowers that have pistils. The juniper is an evergreen prickly shrub, from the berries of which the well-known spirituous liquor called gin is prepared.

112. The misletoe is a parasitical evergreen plant, growing on the trunk and branches of trees. It will not take root in the ground, but if its ripe berries be rubbed into the apertures of almost any tree, they will produce the plant the following year. The hemp is a valuable plant; it seems to have been a native of India, but is now cultivated in various parts of the world.

113. *Polygamia class.*—The character of the twenty-third class is distinguished by the plants having some flowers with stamens only, others with pistils only, and others with all their parts perfect. The most valuable plants of this class are the fig-tree, the plantain, and the acacia. To this class belong the mimosa, or sensitive plant.

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122. Plants sometimes receive particular names from the places they inhabit: these are, First, *Aquatic* plants, comprehending such as grow in the water, and along the sea shore. Second, *Alpine*, including such as grow on the tops of very high mountains. Third, *Hilly*, consisting of such plants, as seem best adapted to dry and gravelly, or sandy hills. Fourth, *Shady* plants, or such as delight in groves and woods. Fifth, *Champagne*, to which division belongs all those plants peculiar to open fields and meadows. Sixth, *Parasitical* plants, comprehending all such as grow on the trunks, branches and roots of trees, and other plants.

123. Plants are likewise divided into three great divisions, according to the duration of their existence; *Annual* plants, are those that last but one year; as barley, maze, or Indian corn. *Biennial* plants, are such as are produced in one year, and arrive to maturity and die the next; as wheat and rye. *Perannial* plants, are those that last many years; as trees and shrubs.

124. All plants seem to grow in the same manner; the genial warmth of the sun, the refreshment of the rains, the same soil seems to suit their respective species; and upon a superficial glance they seem to have the same common parts.

125. A chemical analysis discovers the same constituent principles in all, that is to say, calcareous earth, oil, water, and air, with a portion of iron, to which they owe their beautiful colours.

Although composed of similar materials, their juices to the eye and to the taste appear as different as their forms.

126. The inward structure of plants is as regular and various as their external forms are elegant and well proportioned. This formation cannot have been originally designed, merely to attract and gratify the admiring eye of an accidental spectator, but rather to render the production more perfect.

127. The root, trunk, branch, leaf, flower, fruit, and

seed have each its peculiar character and form, and the microscope displays all their latent beauties to the eye.

Every one of them when dissected and seen by the aid of a glass, appears to be interwoven with complicated meshes, which vary in an endless diversity, and charm the eye by the perfect regularity of the net work.

128. The transverse section of a pear, when magnified, shows first, the acetary which joins the core, composed of regular circles; secondly, the outward pulp formed of globules, ligneous fibres, and radiated vessels, disposed in the most beautiful order; and thirdly, the ring of sap vessels and skin formed of circles and straight lines.

129. No part in the contexture of the smallest fibre or leaf is unfinished, but is formed with the most minute exactness. The seeds of plants have the appearance of shells, unlike in form and diversified with spots and stripes.

Every seed possesses a reservoir of nutriment, designed for the growth of the future plant. This is the matter prepared by nature for the reproduction of the whole species.

130. This nutriment consists of starch, mucilage or oil, within the coat of the seed, or of sugar or subacid pulp in the fruit which belongs to it. The sections of various kinds of trees are crossed with the greatest number of regular figures which the imagination can conceive.

131. The lines are more or less near or remote, according to the solidity or softness of the wood. The lines which form the texture of fir trees are distant; but those of oak are close and compact.—And this difference of texture may serve to account for their greater or less solidity, and the difference of time requisite for them to arrive to maturity.

132. The botanist follows nature into her most retired abodes, and views her in her simple state and native majesty. He remarks some of her productions improved by cultivation in gardens, where amidst all the variety of the

apple and the pear, however distinguished by their size, colour, and taste, he observes that there is but one original species of each, and that they have respectively but one radical character.

133. He beholds the wonderful prodigality of nature even in the composition of the common daisy, which consists of more than two hundred flowers, each including its respective corolla, germ, pistil, stamina, and seed, as perfectly formed as those of a complete lily or hyacinth.

134. And he sees this diversity as fully illustrated in the different sorts of grass, a term which, although it commonly conveys only one notion to the vulgar mind, and one object to the undiscerning eye, consists of five hundred different species, each formed with infinite beauty and variety.

135. The botanist enjoys a pleasing and innocent amusement, most agreeably combined with a love of rural retirement, and which gives a new and growing interest to every walk in the most delightful season of the year.

He collects a harvest from all countries for the purpose of reviewing his treasures at leisure, and growing rich in scientific acquirements.

136. Linnæus observes that "among the luxuries of the present age, the most pure and unmixed is that afforded by the collection of natural productions.

In them we behold offerings as it were from all the inhabitants of the earth; and the productions of the most distant shores of the world are presented to our sight and consideration.

137. And while every one bespeaks its Maker's praise in a different manner, can any thing afford us a more innocent pleasure, a more refined luxury, or one that charms us with greater variety."

MINERALOGY.

MINERALOGY is that science which teaches the nature of mineral bodies, and shows how to characterize, distinguish and class them, agreeable to their respective properties.

2. Mineralogy seems to have been studied in the earliest ages of mankind. Precious stones of various kinds, were well known among the Jews and Egyptians in the time of Moses: and even the most rude and barbarous nations appear to have some knowledge of the ores of different metals

3. As this science is nearly allied to chemistry, it is probable that the improvements both in chemistry and mineralogy, have nearly kept pace with each other; and indeed it is but of late, since the principles of chemistry were well understood, that mineralogy has been reduced to any degree of perfection.

4. The best way of studying mineralogy, therefore, is by applying chemistry to it; and not contenting ourselves merely with inspecting the outsides of bodies, but by decomposing them according to the rules of chemistry.

5. *Classification of Minerals.* If we contemplate the solid parts of this globe, we behold a vast variety of heterogenous bodies. We perceive it to be arranged with an irregularity of distribution, which may well excite our surprise and arrest our attention.

6. Stones, metallic substances, inflammable fossils, and saline bodies are the only component parts of the whole.

7. But in order to arrange our examinations of these substances with greater precision, as well as to facilitate the primary knowledge of minerals in general, mineralogists have divided them into four general classes, distinguishable from each other by very obvious and prominent characters.

8. Whatever division we may adopt or frame, it is

enough that the classification should be made, tl
rals which possess some general obvious or phy
perties, should be arranged together, in order t
certain system.

9. Minerals are generally divided by men o
into ores, earths and stones, mineral or native s
inflammable fossils.

10. But as some of these classes present to
variety of individuals of the same, mineralogists h
under the necessity of subdividing them into ce
nera and species, in order to remove, or at least
tate the numberless difficulties which would othe
pose the acquisition of general scientific knowlec

11. Ores. The name of ores, or metallic ore
are frequently called, is given to all those natura
which are either entirely composed of metals, or
metallic substances constitute the most considera

12. It is from this class of minerals that meta
tained. The number of metals generally known
to twenty-three in number. It is obvious therel
the same number of different genera of ores must

13. Each of which is distinguished by the nai
particular metal, which forms its most essent
namely; the ores of platina, gold, silver, copper,
iron, zinc, mercury, antimony, bismuth, nickel, c
senic, tungsten, tillurium, uranium, molybdena,
titanium, magnesium, columbium and tantalium.

14. *Natural History of Ores.* All ores are
the bowels of the earth, sometimes indeed at the
and more generally in mountains than plains or l
tricts.

15. They are usually met with in crevices, or
rocks, and are then called veins. These veins a
rally deposited upon, or surrounded by some st
stance, which is of a different nature from that
the rock itself is composed.

16. This substance, whatever it may be, is c
matrix of the ore, which however, must not be c

ed with the mineralizing substance, with which the metal is combined, such as sulphur, arsenic, &c. for this latter is chemically combined with the metal, so as not to be separable but by chemical means; whereas, the matrix may be separated by mechanical efforts.

17. METALS. *Gold* is the most precious of all metals. It is of a brilliant yellow colour, and will not tarnish when in a pure state. Its specific gravity is 19 times that of water; and its malleability is such that one guinea may be made to gild a silver wire 500 miles in length.

18. *Silver* is a white metal, next to gold in lustre. It is 11 times heavier than water. It is very malleable and ductile, and of moderate hardness. It is easier melted than gold.

19. *Platina* is heavier than any of the other metals.—Its weight being 23 times that of water. Its colour is white, or rather of a light gray. Its hardness and tenacity are greater than those of gold. It admits of being welded, and cannot be melted in ordinary fires. Gold, silver and platina, are called perfect metals.

20. *Iron* is the most common and useful of all metals. It is about 8 times heavier than water. It mixes with the animal and vegetable kingdoms, and is so well known as not to require a particular description.

21. *Copper* is a metal of a brownish red colour. It is 9 times heavier than water; and may be united with the other metals, and form a variety of useful compounds.

22. *Tin* is a white soft metal 7 times the weight of water. It is very malleable and is often used as a coating to iron and copper.

23. *Lead* is a soft metal of a bluish white colour and is 11 times heavier than water. It has scarcely any elasticity, and is easily melted.

24. *Zink* is a white metal of a radiated texture. It is of a middle kind between the malleable and brittle metals. It is 7 times the weight of water and is used in a variety of useful compounds.

25. *Mercury* or quicksilver is of a white colour, and continues in the fluid state in the coldest temperature of our winter. It only becomes hard or solid at a very great intensity of cold. It is very useful in medical and chemical purposes. It is 13 times the weight of water.

26. *Nickel* is a grayish white metal 9 times as heavy as water. It is very firm and not easily melted.

27. *Arsenic* is a brittle metal of a colour between tin white and lead gray; when exposed to the air it turns black. Its specific gravity is little more than 8 times that of water. It is a poisonous substance.

28. *Bismuth* is of a reddish white colour, of a foliated fracture, and so brittle as to be reduced to powder by the hammer. It is more than 9 times the weight of water.

28. *Magnesium* is a hard white brittle metal. It is nearly 7 times the weight of water; from this metal the well known medical substance called magnesia is obtained.

30. *Molybdena* has a pale lead gray colour and metallic lustre. It is very soft, and is used to mark on paper. Its weight is between 4 and 5 times that of water.

31. *Cobalt* is of a dim gray colour. It is hard and brittle, and not easily melted. Its specific gravity is more than 7 times that of water.

32. *Chrome* is a brittle white metal inclining to gray. It may be crystallized at a very high temperature. A beautiful yellow paint is obtained from this mineral.

The other metals are of a more recent discovery, their properties are less known, and but little applied to useful purposes.

33. *Earths and Stones.* Though there seems to be an almost infinite variety of earths and stones scattered on the face of the globe, yet when this subject is examined with a chemical eye, we find, not without surprise, that all the stones we tread under our feet, as well as the vast variety of specimens in the cabinets of the curious, and even the mould in which vegetables grow, are all

composed of a very few earths, in number not more than ten.

34. Moreover, of these simple earths, seldom more than four or five are found combined together in one substance, to be met within nature.

35. *Natural History of Earths and Stones.* The slightest acquaintance with the stony substances, that come under our inspection, is sufficient to convince us that many of them were once in a soft or fluid state.

36. A vast number of earths and stones have a regular symmetrical arrangement; they appear to have been crystallized like salts, and must therefore have been separated from their solvents, whatever that might have been.

37. The variety of crystals, of stones and earths, discover all the figures and modifications of primitive forms observable in other substances, when suffered to crystallize under favourable circumstances.

38. Moreover, many stones enclose organized substances which they could not have admitted, but in a soft or fluid state; others are evidently formed round different substances, as these, having received their shape and form; the operations of art could never have introduced themselves into them.

39. *Properties of Earths.* Earths, when in a state of purity, are concrete, friable, and opaque substances, whose specific gravity never exceeds five times that of water. They exhibit no metallic lustre.

40. They are infusible and absolutely incombustible, or inconsumable in fire. They are insoluble in water, in the common acceptation of the word. Most of them have no perceptible taste.

41. They are capable of combining with acids, and forming with them a peculiar class of bodies called salts. They are disposed to unite with alkalies, with sulphur, and with each other.

42. In some systems of mineralogy, a distinction is made between earths and stones, but this is of no utility. Stones differ from earths, merely in cohesion and hard-

ness; and hence they are more properly included in one class; for a stone, in fact, is nothing more than a hard earthy mass, and an earth in powder is an aggregate of very minute stones.

43. *Division of Earths and Stones.* From what has been premised, mineralogists have divided earths and stones into the following different genera.

44. Each genus derives its name from the particular earth which constitutes its most predominant part; namely, siliceous, calcareous, aluminous, magnesian, barytic, strontain, glucine, zircon, yitria, and augustine genus.

45. *Siliceous Stones.* Most of the stones belonging to this genus are transparent; they have a vitreous appearance, and a high polish. They are very hard, and scratch glass.

46. Stones belonging to the siliceous genus are, rock crystal, quartz, flint, chert, calcedonies, jasper, agates, cornelians, porphyry, topazes, opals, flexible marble, granite, grit-stone, chrysophrass, adularia, &c.

47. *Calcareous Stones* To this class of earth belong all those stony mixtures in which the properties of lime predominate. Pure calcareous earth or lime, is very rarely met with in nature. Calcareous stones are never hard enough to strike fire with steel.

48. They can be scratched with a pen-knife, all of them are easily reduced to powder, and some are quite friable between the fingers.

49. *Aluminus genus.* Earths and stones belonging to this genus may be discriminated by the following general properties.

50. They are almost entirely destitute of transparency; they exhibit no crystaline or regular shape; they have an opaque appearance, and are destitute of vitreous lustre; they are soft to the touch, and afford a peculiar odour when breathed upon, known by the name of a clayey smell.

51. They are not hard; they may be scratched with a knife. Many of them suffer impressions by the finger nail;

but they become harder from being exposed to heat. The softer kinds absorb water.

52. *Magnesian genus.* Most of the stones of this genus, have almost all a greenish colour; they have more or less a glittering surface. Their texture is generally scaly.

53. They are only semi-transparent, but in general inclined to opaque. They discover no clayey smell by being breathed upon. Stones containing magnesia in considerable quantities are—serpentines, steatites, chlorite, talcs, and asbestos.

54. *Stones of the barytic kind.* Stones belonging to the barytic genus, are peculiarly distinguished by their superior specific gravity, in which they exceed all other stones and earthy minerals. When exposed to heat, they emit a phosphorescent light. They have a spongy appearance; they are less hard than siliceous stones, and may therefore be scratched with a knife.

55. *Stones of the strontian genus.* Of this genus of earth, there are only two species known at present. In the one, the strontian earth is combined with carbonic acid. The first species appears in solid masses; it is composed of long fibres, adhering to each other, and disposed of in a radiated manner.

56. Its colour is generally whitish, and asparagus green, which appears deeper towards the centre of the mass. When broken, its surface is a little shining in certain directions; it is brittle, and has a little transparency.

57. *Stones of the glucine genus.* The glucine earth has hitherto been found only in three stones, namely, in the aigue-marine, or beryl, a transparent stone of a green colour; in the emerald of Peru, of a similar colour; and in the gadolinite.

58. *Stones of the zircon genus.* Hitherto this earth has been found only in two precious stones, namely, the zercon of Ceylon, and the hyacinth. The uncut zircon exists of various colours, but in general the stones from Ceylon are of a reddish brown, inclining to a dim smoky gray. They

have a greasy glossy appearance, and feel smooth to touch. They resemble small flat pebbles.

59. *Stone containing yitria.* The earth called yi is found only in a fossil called yiterby or gadolinite. colour of this mineral is black, and its fracture exa like that of glass. It is magnetic, and soft enough t scratched with a knife.

60. Augustine earth has lately been discovered, bu properties are but little known. It is said to resen the beryl of Siberia.

61. *Gems*, or precious stones, are of various kind They are distinguished by their hardness, weight, co and splendour, and the property of producing singl double refraction; as they will be more readily known f their colours, we shall class them accordingly.

62. *Red gems* are the ruby, the vermillion, garnet, rasole and the cornelian. The ruby is a transparent st the colour of which is more or less red. It consist four kinds, the oriental, the spinel, the balass and the B zilian ruby. Cornelians are either entirely, or in par a beautiful red colour.

63. *Yellow gems* are the topaz, hyacinth and the zir Of the topaz, there are three kinds. The Saxon, Brazilian and the oriental topaz.

64. *Blue gems.* To this class belong the oriental Brazilian sapphires; the aigue-marine and the lapis laz The latter is of a beautiful sky blue colour, someti mixed with white.

65. *Green gems.* Precious stones of a green col are the emerald of Peru and the chrysolite.

66. *The Diamond* is a precious stone different from others. It is very hard and brilliant. Some diamo are of a rose colour, others red, yellow, green, or blue The diamond when heated to combustion burns phosphorus without leaving any vestige behind.

67. *The jasper* is a stone which exhibits a variety colours. It is exceedingly hard and receives a beaut polish.

68. *The agate* is much variegated. It has a shining fracture, and will take a very high polish.

69. *Mineral or native salts*, are those substances which are found in nature, consisting of an earthy, metallic, or alkaline base, combined with an acid. They naturally divide themselves into several genera, namely, calcareous salts, comprehending the combination of calcareous earth with different acids. Barytic salts, comprehending the combination of barytic earth with different acids, &c.

70. We have therefore to consider here merely the combination of alkalies with acids, which, in part, usually are called mineral salts; for they possess the properties of saline bodies in a more striking degree.

71. *Inflammable fossils*, are such mineral substances as burn more or less easily, or whose principal character is inflammability at no very high temperatures. The principal minerals of this class are coals, sulphur, amber, and bitumen.

CHEMISTRY.

CHEMISTRY, as a science, teaches us how to estimate and account for the changes produced in bodies by motions of their parts, which are too minute to effect the senses generally: as an art its practice consists in placing or applying bodies, with regard to each other, in such situations as are calculated to produce those changes.

2. Sir Humphrey Davy has the following beautiful remarks in the introduction to his Elements of Chemistry. "The whole earth undergoes modifications. Acted on by moisture and air, it affords the food of plants; an immense number of vegetable productions arise from apparently the same materials.

3. These become the substance of animals, one species of animal matter is converted into another; the most per-

fect and beautiful of the forms of organic life, ultimately decay, and resolve into inorganic aggregates, and the same, differently arranged, are contained in the inert soil, or blooms and emits fragrance in the flower, or becomes in animals the active organs of mind and intelligence.

4. In artificial operations, changes of the same order occur; substances having the same characters of earth are converted into metals; clays and sands are united so as to become porcelain; earths and alkalies are combined into glass.

5. Acids and corrosive matters are formed from tasteless substances; colours are fixed upon stuffs, or changed, or made to disappear, and the productions of the mineral, vegetable and animal kingdoms, are converted into new forms, and made subservient to the purposes of civilized life.

6. To trace in detail, these diversified and complicated phenomena, to arrange them, and to deduce general laws from their analogies, is the business of chemistry."

7. Heat, or rather temperature, is a well known modification of bodies, and may be considered as the means of converting solid bodies into dense fluids, and dense fluids into elastic fluids, called gas or vapour, while compound bodies may have their parts separated from each other by this treatment.

8. The simple application of heat is distinguished by various terms, according to the nature of the operation, or of the effect produced.

9. *Calcination* is the exposure of a body to strong heat in an open vessel till it undergoes no further change: *Oxidation* is the like process, with metallic bodies: *Fusion* or *melting*, is the changing of hard bodies to a state of dense fluidity.

10. *Roasting* consists in exposing minerals to an open fire to drive off their volatile contents. *Cementation* is a process, wherein solid bodies of different kinds, one or more of them being in powder, are exposed to heat in a vessel nearly closed, with the intention that the more

volatile parts of the one may unite with the other, or its fixed parts.

11. *Eliquidation* is the exposure of a compound body, usually metallic, to fire sufficient to fuse or melt one of its ingredients, which runs out and leaves the other in a porous state.

12. *Digestion* consists in keeping bodies for a considerable time immersed in a fluid, more or less heated, in order to effect some combination between them.

13. *Evaporation* is the dissipation of a fluid by heat: *Concentration* consists of diminishing the proportion of water in any solution of saline matter, either by heating it, or by freezing the surplus water and taking out the ice.

14. When evaporation is performed in any apparatus of vessels, partly or quite closed, and the vapours, after being raised by heat in one part or vessel, are received into another sufficiently cold to condense them into the fluid state, this process is called *distillation*.

15. When a fluid, obtained by distillation, is again distilled, in order to obtain the most volatile part of the first production, this last part is said to be *rectified*.

16. There are many products of evaporation which congeal or become solid, at a temperature much higher than the atmosphere, and are not, therefore, obtained in the fluid, but in the solid state.

17. These usually adhere in the form of crystals, to the upper part of the apparatus, and on this account, as well as because the operation does not in general require the same kind of vessel, it is distinguished by the name of *sublimation*, and the products themselves are called sublimates, or flowers.

18. *Attraction* is that property of matter by which its particles are made mutually to approach and unite with one another. The most striking instances of attraction, are those of all bodies towards the centre of the earth, called attraction of *gravitation*.

19. When between particles of the same species, the

force of attraction operates, it is termed attraction of *cohesion* or aggregation; but when between the particles of different bodies, it is termed attraction of *composition*, or chemical affinity.

20. The mutual attraction of two bodies, exhibits the phenomena of simple electric attraction and rejection, when two principles are presented to each other. Thus water combines with and dissolves gum, but rejects camphor; and alcohol combines with and dissolves camphor, but rejects gum.

21. When three bodies or principles are presented to each other in succession, we may conceive a variety of results, all which appear to take place in nature.

22. They may not principally unite, or two may unite and the third have no action either upon them singly or when in combination, or all three may unite from attractions, exerted by each singly upon the others, and form a triple compound; or two of them may have no attraction for each other, but being both capable of being confined with a third, and this last may be the instrument of a union between the two, and a triple compound will be thus formed.

23. Thus oil and water will not unite, but either of them will unite with an alkali; and if this last be united with oil it forms soap, which can be united with water. Ammonia, potash and soda, are called alkalies.

24. Neither sulphur nor potash have any sensible action on gold; but when they are fused together, they will combine with that metal.

25. If metals be melted and exposed to an intense fire for a considerable time, they imbibe oxygen from the atmosphere; and turn into earthy substances called *oxides*.

26. If a certain quantity of lead, for example, be burnt in this manner, it will be converted into an oxide called red lead; and the red lead so produced will be found to weigh more than the original quantity of that metal the increase of weight arises from the oxygen it imbibes.

27. Oxides may be converted into metals again by depriving them of their oxygen. In the example of red lead, if it be burnt again with powdered charcoal, the charcoal will detach the oxygen from the oxide, and the lead will again be obtained in its pure state: this process is called *reduction*.

28. Vinegar has no perceptible action upon copper, but it can dissolve the compound of copper and oxygen, called the oxide of copper; neither vinegar nor copper have any disposition to take oxygen, from its elastic state in the atmosphere, so that copper and vinegar may be kept together without any solution in a closed vessel; but if the air be admitted, the presence of the vinegar will dispose the copper to take oxygen and form an oxide, and with this combination the vinegar will unite.

29. A knowledge of the gases is very necessary in chemical operations. The simple principles which have been exhibited only in the gaseous forms without being in combination, are oxygen, hydrogen and nitrogen

30 *Oxygen gas* forms about one fourth of our atmosphere. It has neither smell nor taste. It is a little heavier than atmospheric air; under great pressure it can be made to take up about one half of its bulk of water. It is essential to the support of life. It exists in most vegetable and animal products.

31. Combustion is powerfully supported by oxygen gas; any inflammable substance previously kindled and introduced into it burns rapidly and vividly.

32. If an iron or copper wire be introduced into a bottle of oxygen gas with a bit of lighted charcoal at the end, it will burn with a bright light and throw out a number of sparks. This gas may be obtained from nitrate of potash exposed to a red heat in a coated glass or earthen retort, and by other processes.

33. *Hydrogen gas* when perfectly dry is free from smell, and is much lighter than the other gases. Though highly inflammable, it extinguishes burning bodies if completely enveloped in it without the contact of oxygen.

34. It is incapable of supporting life, but does not appear to possess any direct noxious quality, as it may be breathed for several respirations or nearly a minute. Fired, in combination with oxygen, it explodes with a loud noise.

35. But if kindled as it escapes from the extremity of a tube into the atmosphere, it burns with a calm and regular white blaze.

36. This gas is procured in different ways. But the readiest method is to employ an acid, as the sulphuric diluted with five or six times its weight of water poured on iron filings, or zinc in small pieces. These ingredients expel the atmospheric air from the vessel in which they are contained.

37. *Nitrogen gas*, or carbonic acid gas, is the first of the elastic fluids that appears to have been distinguished from common air. It is destructive to animal life. Its deadly properties have been experienced in many subterraneous caverns, constituting what is called the *choak damp*.

38. When this gas is emitted from a fermenting liquor, it at first fills the empty portion of the vat, displacing the lighter atmospheric air, and then flowing over the sides, almost as water would do. For the same reason, if a bottle be filled with it, and be inverted over the blaze of a candle, at some distance, it will descend and extinguish it.

39. The above are the principal gases, but these receive different names as they are combined with other fluids; as carbonated hydrogen, which holds a portion of carbon in solution, and phosphorated, muriated, and nitrous, each of which holds in solution a portion of the substance from which it takes its name.

40. *Acids* are powerful agents used in chemical combinations. They unite with all the alkalies, and most of the metallic oxides and earth, and form a compound called natural salts, more or less soluble in water. Acids when

applied to the tongue excite the sensation of sour; they change the blue colours of vegetables to a red.

41. The following are the principal acids used in chemistry, viz. sulphuric, nitric, muriatic, nitro-muriatic, oxygenized muriatic, phosphoric, acetous, tartareous, and boracic acids.

42. The foregoing may give the learner some knowledge of the principles of chemistry. But this science opens an immense field for the progress of study. The following observations are from Chaptal's Chemistry.

43. This art is not only of advantage to agriculture, physics, mineralogy, and medicine, but its phenomena are interesting to all orders of men; the applications of this science are so numerous, that there are few circumstances of life in which the chemist does not enjoy the pleasure of seeing its principles exemplified.

44. Most of those facts, which habit has led us to view with indifference, are interesting phenomena in the eyes of the chemist. Every thing instructs and amuses him; nothing is indifferent to him, because nothing is foreign to his pursuits; and nature, no less bountiful in her most minute details, than sublime in the disposition of her general laws, appears to display the whole of her magnificence only to the eye of the chemical philosopher.

MECHANICS.

As this science is closely connected with the arts of life, particularly with those which existed even in the rudest stages of society, the construction of machines must have been practised long before the theory upon which their principles are founded could have been well understood.

2. Hence we find in use among the ancients, the lever, the pulley, the crane, the capstain, and many other simple

machines, at a period when mechanism, as a science, was unknown.

3. In the remains of Egyptian architecture, are beheld the most surprising marks of mechanical genius. The elevation of immense and ponderous masses of stone to the tops of their stupendous fabrics, must have required an accumulation of mechanical power, which is not in the possession of modern architects.

4. We are indebted to Archimedes for the foundation of this science: he demonstrated, that when a balance with unequal arms is in equilibrio between two weights in its apposite scales, these weights must be reciprocally proportional to the arms of the balance.

5. From this general principle, the mathematician might have deduced all the other properties of the lever, but he did not follow the discovery through all its consequences.

6. In demonstrating the leading properties of the lever, he lays it down as an axiom, that if the two arms of the balance are equal, the weights must be equal to give an equilibrium.

7. Reflecting on the construction of a balance which moved upon a fulcrum, he perceived that the two weights exerted the same pressure on the fulcrum as if they had both rested on it.

8. The mechanical powers are usually reckoned six in number; they consist of the lever, the wheel and axis, the pulley, the inclined plane, the wedge and the screw.

9. *The lever* is the simplest of all machines, and is a straight bar of iron, wood, or other material, supported on, and moveable about a prop, called a fulcrum.

10. *The wheel and axis* is a machine much used, and is made in a variety of forms. It consists of a wheel with an axis fixed to it, so as to turn round with it, the power being applied at the circumference of the wheel, and the weight to be raised is fastened to a rope, which coils round the axle.

11. *The pulley* is a small wheel turning on an axis,

with a drawing rope passing over it; the small wheel is usually called a sheeve, and is so fixed in a box or block, as to be moveable round a pin passing through its centre. Pulleys are of two kinds: the fixed, which do not move out of their places; and moveable, which rise and fall with the weight.

12. *The inclined plane* is formed by placing plank, earth, or any other materials in a sloping direction. It is of very great use in rolling up casks, and other heavy bodies.

13 The force with which a body ascends upon an inclined plane, is to the force of its absolute gravity by which it would descend perpendicularly, in free space, as the height of the plane is to its length.

14. Hence it must appear evident, that the less the angle of elevation, or the more gradual the ascent is, the greater will be the weight which a given power can draw up.

15. The inclined plane, when combined with other machinery, is of great use in the elevation of weights; it has likewise been made use of in the late duke of Bridgewater's canal, in England.

16. After this canal has extended about forty miles on the same level, it is joined to a subterraneous navigation about twelve miles long, by means of an inclined plane; and this subterraneous portion is again connected by an inclined plane with another portion, 100 feet above it.

17. This plane is a stratum of stone, which slopes one foot in four, and is about 450 feet long. The boats are conveyed from one level to another by means of a windlass; so that a loaded boat, descending along the plane, turns the axis of the windlass, and raises an empty boat.

18. *The wedge.* The fifth mechanical power is the wedge, which may be considered as two equally inclined planes joined together at their basis. The wedge is a very simple but useful instrument, since not only wood, but even rocks can be split by it, from its being driven into them.

19. This would be impossible to effect by the lever, wheel and axle, or pulley; for the force of the blow or stroke in driving the wedge, shakes the cohering parts and thereby makes them separate more easily.

20. *The screw.* The sixth and last mechanical power is the screw; which cannot properly be called a simple machine, because it is never used without the application of a lever or winch to assist in turning it; and then it becomes a compound engine of a very great force, either in pressing the parts of bodies closer together, or in raising great weights.

21. It may be conceived to be made, by cutting a piece of paper in the form of an inclined plane or half wedge, and then wrapping it round a cylinder; the edge of the paper will form a spiral line, and give the thread of the screw.

22. It being evident that the winch must turn the cylinder round once, before the weight of resistance can be removed from one spiral winding to another; therefore, as much as the circumference of a circle described by the handle of the winch is greater than the interval or distance between the spirals, so much is the force of the screw.

23. Thus, supposing the distance of the spirals to be half an inch, and the length of the winch twelve inches, the circle described by the handle of the winch where the power acts, will be 76 inches nearly, or about 152 half inches; and consequently, 152 times as much as the distance between the spirals.

24. Hence it is, that a power at the handle, whose intensity is equal to no more than a single pound, will balance 152 pounds acting against the screw; and as much additional force as is sufficient to overcome the friction, will raise the weight of 152 pounds; and the velocity of the power will be to the velocity of the weight, as 152 to one.

25. The screw is of extensive use in the printing press, and in the press for coining money, and in a great variety of other purposes.

ARCHITECTURE.

ARCHITECTURE is that science which relates to the construction of all sorts of edifices, appropriated to the purposes of civil life; and teaches the orders designs, forms, and proportions to be observed in erecting those buildings.

2. History furnishes us with very vague and unsatisfactory accounts of the rise and progress of this science, although a variety of speculations have been indulged to locate and fix its origin in India and Egypt, and we are at this late day left to doubt whether the eastern quarter of the world has any decided claim to originality over that of Egypt.

3. As geometry was first studied and reduced to a system in Egypt, and as the rules of proportion in architecture are founded on geometrical principles, we may, indeed, conclude, that in ancient Egypt this science first originated.

4. All the variety of objects that present themselves to our view in the material world, are considered beautiful or deformed, in relation to their shape and size, corresponding with the fitness of the parts to the end designed.

5. Proportion and symmetry always convey pleasurable ideas; and, therefore, the sensations of pleasure that are felt from the observance of an object well proportioned, must owe their existence to their proper distribution of all the parts combined in unison, to the expression of a decided character.

6. The orders of architecture in which all the variety of genius and art has involved itself, and which is regulated by settled proportion, with such certainty as to defy and mock all attempts at innovation, are five in number, viz. the Tuscan, Doric, Ionic, Corinthian and Composite. The Doric, Ionic and Corinthian, were invented by the Greeks.

7. Proportion constitutes an order, and consists of three grand divisions, the base, column, and entablature.

8. *Doric order.* The general figure of the Doric consists of but few parts, even as practised in the most refined ages of Greece: the fluted shaft, terminating with one, two, or three annular channels; the capital, consisting of the fillet and a bold echinus, having the same common axis as the shaft, and the crowning abicus form the entire column; which, therefore, consists of a base and shaft this column or shaft diminishes with a beautiful curve line from the bottom to the belt below the annulets.

9. The general proportions of the Doric order are the following:—The columns are six diameters in height; the superior diameter is four-fifths, and the altitudinal dimensions of the capital, two-fifths of the inferior diameter including the annulets, echinus, and abacus. The height of the capital is divided into two equal parts, giving the upper one to the abicus, and the lower one to the echinus and annulets.

10. *Ionic order.* After the Doric, the ambitious desire of novelty soon led the way to the invention of another species, and in erecting the temple of Diana, a new order, imitating the proportion and dress of women, was introduced.

11. The diameter of the columns was made an eighth part of their height; the base was made with folds representing the shoe; the capital, with volutes in form of curled hair worn upon the right and left, and the cymatium for the locks pending on the forehead, from the crown.

12. This new order they called Ionic, after the name of the country in which it was invented, was, we are informed, by Vitruvius.

13. Modern architects have added a diameter to the Ionic column, making it nine instead of eight; the shaft is generally striated into twenty-four flutes, and as many fillets.

14. The height of the entablature in general, may be

two diameters; but where grandeur as well as elegance is required, it should not be less than a fourth of the column.

15. *Corinthian order.* The invention of this order is attributed to one Callimachus, an Athenian sculptor, who, passing by the tomb of a young lady, observed an acanthus growing up by the side of a basket, which was covered with a tile and placed over the tomb, and that the tops of the leaves were bent downwards by the resistance of the tile, took the hint and executed some columns with foliated capitals, near Corinth.

16. Vitruvius mentions that the shafts of the Corinthian have the same symmetry as the Ionic, and the difference of the symmetry between the entire columns, arises only from a difference of the heights of their capitals; the Ionic being one-third, and the Corinthian the whole diameter of the shaft.

17. The sides of abacus of the Corinthian capital are concave, and moulded on the fronts. The lower part of the capital consists of two rows of leaves, and each row of eight plants; one of the upper leaves fronting each side of the abacus which crowns the capital, and the stock of each leaf springing between each of the two lower leaves.

18. The Corinthian capital exhibits the utmost degree of elegance, beauty, and richness, and delicacy that has ever been attained in architectural workmanship.

19. *The Tuscan order.* There are no ancient remains of any entire order of this kind; the columns of Trajan and Antonine, and one at Constantinople being defective for want of their entablatures.

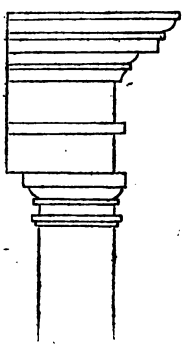
20. We have the description of Vitruvius to the following purpose: The column is seven diameters in height, and is diminished at the top to a fourth part of a diameter. The base is half a diameter in height, has a circular plinth, and is divided into two parts.

21. The capital is also half a diameter in height, and is divided into three equal parts, and the architrave is made with its vertical face over the edge of the column.

22. *Composite order.* The character of this as an order,

ORDERS OF ARCHITECTURE.

TUSCAN.



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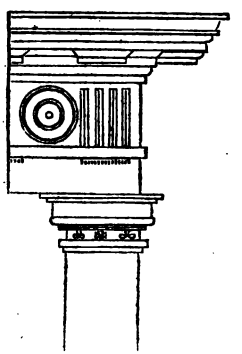

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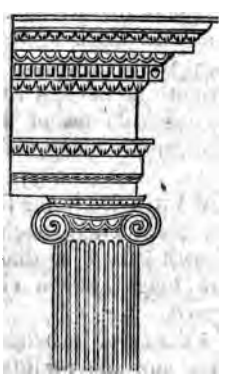
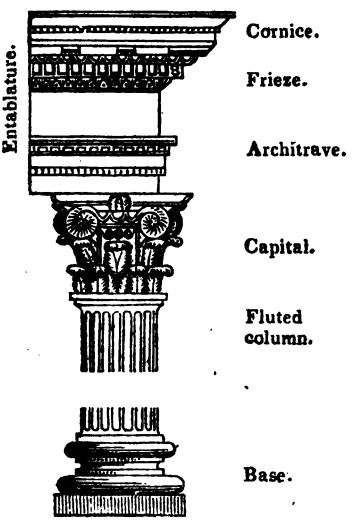


CORINTHIAN.

COMPOSITE.



is indicated by its capital; the upper part of which, being an entire Ionic capital of that species which fronts the four sides of the column alike, and the lower part consisting of two rows of leaves as in the Corinthian capital.

23. Vitruvius speaks of various capitals derived from that of the Corinthian, but does not distinguish columns with such capitals supporting an entablature, by the name of an order.

24. The Romans decorated their Composite capitals with acanthus leaves, and the same practice is followed by the moderns. The proportions of this order will be fully understood in those of the Ionic and Corinthian.

25. *Mouldings.* In architectural decorations the materials are formed into a variety of shapes. Such as have in any two places, sections of similar figures at right angles to their surface; in these two places the thin forms of this property are called mouldings, and when one, two, or a

collection of mouldings, with or without a fillet, crown a broad flat member, this collection is called compound moulding.

26. *Basement.* A basement is the lower story of a building on which an order is to be placed; its height will therefore be variable, according as it is a cellar or ground story; or when it is the ground story, according as there are principal rooms in both stories, or only in one of them.

27. *A pedestal* is a part of some building with a base, surmounted with a rectangular prismatic solid, called the die, and this die again crowned with a cornice for supporting a colonnade or pilistrade, or sometimes for supporting the upper part of a building as a basement.

28. *An arcade* is an aperture in the wall, with an arched head; which term is also sometimes applied in the plural number to a range of apertures with arched heads.

29. *A colonnade* is a range of attached or insulated columns, supporting an entablature. The intervals between the columns, measured by the inferior diameter, is called the inter-columniation; and the whole area between every two columns is called an inter-column.

30. *A balustrade* is a range of small columns, called balusters, supporting a cornice; used as a parapet, or as a screen to conceal the whole or part of a roof; it is also sometimes used as a decoration for terminating the building.

31. *An attic* is a part of a building standing on the cornice, similar in form to that of a pedestal, and is either broken or continued. The use of an attic is to conceal the roof, and give greater dignity to the design.

32. *A niche* is a recess in a wall, for the purpose of enshrining a statue, or some other ornament, or as an ornament itself. Niches are susceptible of the same decorations as windows.

33. *A vault* is an interior roof over an apartment, rising in a concave direction from the walls which support

it, either meeting the vertex in a point or line, as when the section of the arch is Gothic, or one continued arch from one abutment to the other, as when the section is a semicircle.

34. The use of gates, doors, windows, and chimnies in a building, is so well known as to need no particular description.

35. *Taste* in building consists in introducing such forms in the construction and embellishments as appear agreeable to the eye of the beholder. The arrangement of the plan, figure of rooms, and contour of the whole building, and character, as to its destined purpose, depend much on taste.

PHILOSOPHY.

NATURAL PHILOSOPHY is that science which considers the powers of nature, the properties of natural bodies, and their action upon one another. Laws of nature are certain axioms, or general rules, of motion and rest, observed by natural bodies in their actions upon one another.

2. Of these laws sir Isaac Newton has established three. The first is, "that every body perseveres in the same state, either of rest or uniform motion, unless impelled to change that state by the action of some foreign force or agent.

3. Thus projectiles persevere in their motions, except so far as they are retarded by the resistance of the air and the action of gravity: and thus a top once set in motion, only ceases to turn round because it is retarded by the air, and the friction of the plain upon which it moves.

4. Thus also the larger bodies of the planets and comets preserve their progressive and circular motions a long time in regions void of all sensible resistance

5. The second law is, that the motion, or change of motion is always proportional to the moving force by which

it is produced, and in the direction of the right line in which that force is impressed.

6. If a certain force produce a certain motion, a double force will produce double the motion, a triple force, triple the motion and so on.

7. And this motion, since it is always directed to the same point with the generating force, if the body were in force before, is either to be added to it as when the motions conspired or substracted from it when they are opposite.

8. The third law is that, "reaction is always contrary or equal to action; or the action of two bodies upon one another are always mutually equal and directed contrary ways, and are to be estimated always in the same right line."

9. Thus if whatever body presses or draws another it is equally pressed or drawn by it. So if I press a stone with my finger, the finger is equally pressed by the stone.

10. If a horse draw a weight forward by a rope, the horse is equally opposed or drawn back towards the weight; the equal tension or stretch of the rope hindering the progress of the one, as it promotes that of the other.

11. When two bodies meet, each endeavours to persevere in the same state, and resists any change; and because the change which is produced in either may be equally measured by the action which it excites upon the other, or by the resistance which it meets from it, it follows that the change produced in the motion of each are equal, but are made in contrary directions.

12. MENTAL PHILOSOPHY is that science which teaches us the laws of our mental frame, which shows us the origin of our various modes and habits of thought and feeling, and how they operate upon one another.

13. The well directed study of it calls into action and improves the highest intellectual faculties; and while it improves the powers of the mind, it suggests the best

means for their culture, and the best mode for their direction.

14. It enables us to trace the intricacies of our own hearts, and points out the proper discipline for their correction. It discovers to us the real excellencies of the mind, and guides us in our efforts for the attainment of them.

15. Pursued with proper views and in a proper manner, it lays the best foundation for the highest degrees of intellectual, moral and religious improvement.

16. That whatever it be which thinks, and feels and wills is called the mind: that part of the human being, which thinks and feels and wills, is called the human mind.

17. We observe within us and without us numerous phenomena; the object of philosophy is, to deduce from them certain general laws, agreeable to which they are produced, and then to employ those laws in the explanation of other phenomena.

18. If we hold a luminous body before the eye, it produces some change in the state of that organ, and this produces in the mind a feeling; this feeling is called sensation.

19. This name is also given to all those other feelings which are produced in a similar way, *viz.* owing to a change in the organs of sense, whatever be the cause by which the change is produced, whether from *smell*, *hearing*, *touch* or *taste*.

20. We know as a matter of fact, that though sensation ceases soon after the exciting object is withdrawn, yet if they have been produced sufficiently often and vividly, the causes of feelings similar in kind remain in the mind, and those similar feelings can occur when no change is produced in the organs of sense. These are called ideas; they are the effects of sensation.

21. The operation, or act of retaining relics of sensations may, with the strictest propriety, be termed retention; and to account for it we infer that the mind pos-

sesses a power or capacity which we may call the i
tive power.

22. The associative power, if not the sole ca
our mental phenomena, except the original product
sensorial changes and tendencies to them, has some
in the origin and modification of them all.

23. It is owing to this important principle, that
sation becomes the sign of thoughts and feelings, by
means man becomes a social being; that the whole n
furniture of preceptions, passions, sentiments, emo
&c. is formed from the simple relics of sensation;
man from mere sensation rises to intellect and be
capable of reflection.

24. "It may be well to consider how nature te
us to analyze, and how conformable to that method w
explain the origin and generation either of ideas or
mental faculties; and how nature gives us the first l
in the art of thinking.

25. The senses are the only occasional cause o
impression which the object makes upon us. It
mind that feels; it is to the mind alone that the s
tions belong, and feeling is the first faculty which w
mark in it.

26. This faculty is distinguished into five sort
cause we have five sorts of sensations. The mind
through hearing, seeing, smell, taste, and chiefly th
touch.

27. The elements of the language of action were
with man, and these elements are the organs which
gave us. Thus there is an innate language, thou
innate ideas.

28. Indeed it was necessary that the elements o
guage prepared beforehand should precede our idea
cause without signs of any species, it would be impo
for us to analyze our thoughts, in order to account t
selves for what we think.

29. Men begin to speak the language of action a
as they feel, and they then speak it without design

mmunicate their thoughts; for in the beginning they ave predetermined nothing.

30. The physical and occasional cause which preserves recalls ideas, is in the determinations of which the rain, this chief organ of feeling, has acquired a habit, id which still subsist or are reproduced, even when the nses cease concurring in them; for we could not retrace ourselves the objects we have seen, heard or touched, if e movement did not take the same determinations as it kes when we see, hear or touch.

31. In short, the mechanical action follows the same ws, whether we experience a sensation or only remem- r that we have experienced it. I have often heard it ked; what becomes of the ideas which we cease to re- llect? Where are they preserved? Whence do they re- rn when they re-offer themselves to our memory?

32. From those questions and the answers metaphysi- ans return to them, one would believe that ideas are like l things of which we lay up stores, and that the memory but a vast magazine.

33. It would be just as reasonable to give existence to e different figures a body has successively undergone, id to ask What becomes of the roundness of this body hen it takes another figure? Where is it preserved? And hen this body becomes round again, whence does its oundness come!

34. Ideas are like sensations, modes of being of the ind. They only exist as long as they modify it.

All the phenomena of memory depend upon the habits ntracted by the moveable and flexible part of the brain, id all the movements of which these parts are susceptible, are united with one another the same way as the leas which they recal are united with each other." *Condillac.*

35. Moral Philosophy. Since much of the happiness this life, much of our ability to benefit others, since in ort the happiness of a boundless existence, depends on a proper regulation of our conduct and affection,

surely it must be an object of the first importance that we should learn the regulation to which they should be submitted.

36. To know our duty and practise it, are indeed two different things; but to practise our duty well, certainly requires that we should know it well.

37. How shall we know it? shall we consult the laws of the land; or make the general conduct of mankind our guide? shall we blend our actions implicitly with the rules of holy writ, or follow invariably the dictates of our own consciences?

38. All these are valuable; some are of inestimable value; but they do not supercede the necessity of moral investigation. In the first place we will consider what are the obligations which relate to voluntary actions.

39. We say we are obliged to walk if we wish to have health; we are obliged to regular exertion if we wish to acquire valuable mental habits; we are obliged to perform certain actions in order to attain certain ends.

40. Moral obligation respects those actions which are denominated virtuous or vicious; we are obliged to perform the one, and to abstain from the other, because this is the necessary means, in order to effect a certain end, or certain ends. That is to say, unless we do practise virtue and abstain from vice, we cannot obtain the end which wisdom points out as deserving pursuit.

41. The first pleasures and pains of human beings are obviously those of sensation, and they form one source of enjoyment, and still more of suffering during the whole of life. It is from these that the whole round of mental or intellectual pleasures and pains is composed.

42. To estimate the value of these pleasures, in their uncompounded states, take the extreme case, that any one pursued them as primary objects laying aside all restraint from the virtues of temperance and chastity, he would soon destroy his bodily faculties, thus rendering the objects of sensible pleasure useless, and he would precipitate

into pain, disease, and death, evils of the first magnitude even in the eyes of the voluptuous.

43. In the investigation of moral philosophy we may learn how to regulate our conduct in the pursuit of happiness. How to cultivate the tender plants of humility and benevolence. How to check the pernicious influence of pride and vanity in our hearts. How we should regulate and exercise the principles of sympathy, friendship and love. How we may enjoy rational pleasures by the restraint of vicious propensities.

44. When we consider our ignorance of futurity, and the little time and leisure possessed by the generality of men for the investigation of the consequences of their actions, we must readily admit the necessity for some general rules of conduct.

45. In many cases we are unable to trace precisely those consequences of our actions which are immediate and apparent, still less those which arise silently and gradually in the lapse of time. They may operate when the agents have long ceased to exist as children of mortality. Our actions may influence others; our deviations may produce more extensive deviation of which we have no knowledge.

46. The celebrated Hartley lays down the ten following rules of morality. I. That we obey the scripture precepts, in the plain natural obvious meaning of them. II. That we should pay great regard to the dictates of our own moral sense, and to those of others. III. That in deliberate actions we should weigh the probable consequence on each side.

47. IV. That we are not to be guided implicitly by the mere impulse of compassion and good will; yet that great regard should be paid to them in our conduct. V. That we should place ourselves in the situations of the persons concerned. VI. That persons in the near relations of life, benefactors and dependants have, in most cases, a prior claim to strangers.

48. VII. That benevolent and religious persons, all

other things being equal, have a prior claim to the rest of mankind. VIII. That we should contribute as far as lies in our power, to the moral and religious improvement of others. IX. That we ought to pay the strictest regard to truth, both in our affirmations and our promises. X. That we ought to obey the civil magistrates and the laws of the community.

HISTORY.

If the value of each department of knowledge is to be ascertained by the esteem in which it is held by the generality of readers, a place of distinguished honour must be assigned to history. Gratifying that curiosity which is common in the mind of man, it is equally delightful to those whose intellect is just dawning, and to those whose faculties are matured by the lapse of time and the process of cultivation.

2. Comparatively few have a relish for abstract speculations; but almost all are delighted with the display of facts. By the figures which are exhibited in a faithful narrative, the fancy is gently excited, and the feelings are interested without being agitated to a degree inconsistent with pleasure. If then, we consider history only as a source of amusement, it is an object of no inconsiderable importance.

3. But this is, in fact, the lowest commendation to which history is entitled. It is eminently productive of signal utility. The poet has justly remarked, that "the proper study of mankind is man;" and it is the office of history to trace the progress of man from the savage state, and through the intermediate degrees of civilization, to the nearest approaches to perfection, of which social institutions are capable.

4. It falls within its province to rate the effects of laws and political regulations, and to record the wonderous re-

volutions which have been produced in states by external violence, and no less astonishing changes, which have been occasioned by the gradual corruption of ancient systems of governments.

5. The record of past transactions, when diligently and minutely examined, will offer warning and instruction to the politician. It will point out the sources of the errors of former days, and will also lead him to the discernment of the means which have crowned with success such plans as have been productive of benefit to the public.

6. Happy are the directors of political affairs who learn, in the philosophy of history, those lessons which their predecessors have learned by the process of painful experience.

7. In a political point of view, the general influence of historical knowledge, is indeed of the highest importance; it tends to prevent the recurrence, and to diminish the remaining influence of superstition and religious persecution, and of the long train of calamities with which those enemies of human happiness are accompanied.

8. For, who can read the memorials of the papal usurpation in the dark ages, and of the melancholy consequences by which they were followed, without imbibing a spirit of tolerance, and a determined disposition to discountenance any claims which may receive the unjust assumption of inordinate spiritual power?

9. In short, history, whilst it details the miseries and misfortunes which have, upon various occasions, befallen civilized man, it instructs him how these miseries and misfortunes may hereafter be avoided.

10. In a moral point of view, history is extremely useful, as it points out the issues of things, and exhibits, as its general result, the reprobation consequent upon vice, and the glory which awaits virtue.

11. In his days of nature, the oppressor may be applauded by the venal whilst he lords it over his fellow men, and the wanton destroyer of the human race may

be hailed as a hero by the obsequious and mistaken multitude.

12. But when his dust is mingled with that of the victim of his cruelty and ambition, history summons him to her tribunal, she scrutinizes his deeds with impartial strictness, and passes sentence on him according to his deserts.

13. The prejudices and errors of times past will hereafter be done away, and corrected by history, which redresses the wrongs of the injured, and treats with just contempt the insolent assumption of the undeserving.

14. The student who wishes to pursue his historical inquiries with becoming accuracy, must make himself master of the details of geography, and of the principles of statistical calculations; must, moreover, be versed in all the minutia of chronological researches.

15. The materials for moral and political history are very numerous. To notice them all in detail, would be almost an endless task; but in order to make due profit of these materials, wherever they may occur, the student ought to be animated by the spirit of philosophical inquiry.

16. "Incredulity," says Aristotle, "is the foundation of all wisdom;" without the gift of discrimination, the historian degenerates into a chronicler of fables. The correct historian must have a minute knowledge of the human heart, and be qualified to analyze the passions and prejudices of men. He must give due weight to circumstances and situations.

17. The enlightened student of history will not direct his chief attention to the frivolous anecdotes of a court, but to the circumstances which stamp the character and decide the destiny of a nation.

18. NATURAL HISTORY, in its most general sense, signifies a knowledge of the whole universe. But in a more appropriate and limited meaning, it signifies a description of those substances of which the earth is composed, and of those organized bodies, whether vegetable,

mineral, or animal, which adorn its surface, fly in the air, or dwell in the bosom of the waters.

19. Minerals occupy the interior parts of the earth in rude and shapeless masses; consisting of inanimate substances, known by different properties and different names.

20. Vegetables clothe its surface with verdure, they imbibe nourishment from the earth through their roots, respire by means of leaves, and continue their kind by the dispersion of seeds.

21. Having given a brief notice of what belong to the vegetable and mineral kingdoms, under the heads of Botany and Mineralogy, we shall confine ourselves to that part of natural history which relates to animals.

22. Animals enjoy sensation by means of a living organization. They are furnished with different members for the different purposes of life, organs for their different senses and faculties, or powers for the application of their different perceptions.

23. Man, who rules and subjugates all other beings, is, by his wisdom alone, capable of forming just conclusions from such natural bodies as present themselves to his senses.

24. He alone can reason from consequences to remote causes, and trace an idea of the Almighty from the visible objects of creation. A religious sense of deity, therefore, is the characteristic peculiarity which decidedly marks a separation between man and all other animals. There are other obvious distinctions. His erect posture and majestic deportment announces his superiority. He alone sheds the tears which arise from the emotions of sensibility unknown to other animals; and he alone expresses the gladness of his soul by laughter.

25. Every region of the globe, with very few exceptions, is found to be replete with life. To produce organized and animated beings, is the constant employment of nature, and her prolific power knows no bounds.

26. Animated beings are divided into four orders, viz.

beasts, birds, fishes and insects. A scientific treatise of the first is termed Zoology, of the second Ornithology, of the third Icthyology, and of the fourth Entomology.

27. "The different species belonging to the first class of animals, including serpents, amount to about 150. The different kinds of birds known and described, are about 500 in number. The number of fishes, excluding shell-fish, as many; but if the shell fish be taken in, more than six times the number. The insects of both land and water, amount to about ten thousand."

28. *Quadrupeds.* All those animals having four feet, and bodies covered with hair, are called quadrupeds. As they inhabit the same soil with man and are for the most part subject to his will, they deserve his attention more than any other animals.

29. The size and appearance of quadrupeds vary by regular gradations, from the mouse up to the elephant.—They breathe through their lungs like the human species, and have warm red blood flowing through their veins.

30. Though the general character of quadrupeds are so obvious, there are several species which seem to be of an equivocal nature, and which form the links uniting different animals together; as the bat and porcupine, the former which possesses wings and the latter quills like birds.

31. The Armadillo is covered with a hard shell by which it seems to partake of the nature of insects, or snails; and the seal, though evidently of the quadruped kind, is furnished with fins, and resides almost constantly in water.

32. *Amphibious animals* are those that are capable of living either on land or in the water. They are furnished with lungs and an air bladder for this purpose; such as the aligator, otter, beaver and tortoise.

33. *Birds.* The generic characters of this class of animals are these; the body is covered with feathers, and furnished with two legs, two wings, and a hard horny bill. They are more numerous in their different kinds

than quadrupeds; and inferior to the brute creation in the powers of attack and defence. They however, possess a greater faculty for an escape, and generally avoid their enemies by an aerial flight.

34. Their power of sight is superior to that of either man or brute. This faculty seems necessary for their safety and support. Aquatic birds are such as live principally on water. They have webbed feet to assist them in swimming. But other birds have their toes disjoined, to enable them the better to catch their prey, or to cling to the branches of trees.

35. *Fishes* form a class of creatures that appear both in structure and sagacity quite inferior to other animals. A ceaseless desire for food seems to be the ruling impulse of their actions, and their life one continued scene of violence or evasion.

36. Fishes generally present the same external form, sharp at both ends, and bulky in the middle; which shape is the most convenient for their passage through the watery element.

37. Their instruments of motion are their fins, of which the general compliment is two pair, besides three single ones. They answer a similar purpose to a fish as wings do to a bird.

38. Fishes are furnished with a kind of slimy glutinous matter, which overspreads the body and defends it from the corrosive qualities of the water. Beneath this matter some have a strong covering of scales, like a coat of armour to protect the body from injuries.

39. *Insects.* The distinguishing characters of insects are, that their bodies are covered with a sort of bony substance instead of skin; and their heads generally furnished with horns. An insect may more properly be defined as a small animal, destitute of warm red blood, and having no bones nor cartilages; the eyes without covering, and a mouth or trunk opening contrary to the natural order with other animals.

40. The foregoing definitions comprehend the whole

class of insects of every description. But they are so numerous and so various that a minute history of all of them never can be given.

41. Throughout universal nature, a gradation of beings may be traced, and yet their particular difference eludes the observation, like the various colours of the rainbow, blending and mixing with each other.

42. Where vegetation ceases, or seems to cease, perception begins; and we can trace some of the first rudiments or sparks of it in the sea anemone, the oyster and the snail.

43. Then it descends through various gradations of beings, distinguished by more enlarged and more active faculties; more perfect and more numerous organs, to those creatures which approach to the nature of man.

44. We behold the distant resemblance of his sagacity in the elephant, of his social attachment in the beaver, and the rude traces of his form in the ourang outang.

45. Such a variety of animals found in the world, is a just subject of astonishment. Many are visible to the naked eye, but the magnifying power of glasses have opened new scenes of life to our view.

46. The green leaves, the blades of grass, the pools of stagnant water, are as fully peopled with inhabitants, in proportion to their size, as the broad river, deep forest, and wide-spread ocean which diversify the globe.

47. The moss and grass to the insects inhabiting them, are gardens and forests. The drops of water are as seas, and the grains of dust and sand are precipices and mountains.

48. In places most remote from the abodes of men, and in every element are animals to be found. Among the rocky coasts are discovered tribes of shell-fish; in the wide and open ocean, the shark and grampus seek their prey; and in the northern seas, amidst the masses of ice, which abound in the polar circle, the mighty whale secures his wintry retreat.

49. In the deep forests of the Cape of Good Hope,

walks the gigantic elephant, and among the sedges of the Nile and the Ganges, lurks the insidious crocodile. The rose coloured flamingo inhabits the miry shores of the Southern ocean; the huge buffaloe ranges the wilds of America; and the white bear holds its solitary empire upon the frozen regions of the arctic circle.

50. Among the sands of Africa, the ostrich deposits her eggs, leaving her young to the fostering care of nature; and upon the summits of mountains inaccessible to man, the eagles frame their capacious eyry.

51. The figures and proportions of animals, the number and position of their limbs, the substance of their flesh, the bones and integuments, and more particularly the human frame, are replete with discoveries of the most admirable contrivance, as to their arrangement and fitness for their different uses.

52. Nothing appears better calculated to give us a proper conception of the wisdom, design and workmanship of the Deity, than to examine the organization of animals.

53. Anatomy and astronomy, as Fontenelle observes, are the studies which present us with the most striking view of the two greatest attributes of the Supreme Being.

54. The one fills the mind with the idea of his immensity, in the largeness, distance and number of the heavenly bodies; the other astonishes with his intelligence, in the variety and delicacy of animal mechanism.

ANTIQUITIES.

ANTIQUITY, as a science, leads us to an investigation of the nature and intention of those remaining objects, which owe their origin to the labour and ingenuity of ancient nations. As it offers to our reflections all those productions of human industry, which have through numerous ages withstood the corroding hand of time, it will ever be a study highly interesting to the curious.

2. Among the most important subjects which are calculated to amuse the antiquarian, and which serve as the visible testimonials of the civilization and improvement of former people, may be enumerated the remains of edifices, monuments, inscriptions, archives, implements of husbandry, coins, medals and sepulchres.

3. Lord Bacon represents antiquities as the wrecks or fragments of history. By investigating their intention and use, our attention is naturally directed towards those people with whom they originated; and consequently the study of antiquities is calculated to stimulate the mind to other historical inquiries.

4. But, instead of expatiating largely on the nature of this subject, it may be more interesting to the reader, to be presented with some of the principal curiosities of the ancient arts of mankind.

5. The continent of Asia presents innumerable traces and vestiges of former civilization, and the relics of ancient opulence and splendor. Amongst the ruins of many cities, those of Balbec and Palmyra seem best calculated to reward the researches of antiquarians. The rectangular temples of those cities are very extraordinary in point of extent, and the superb style of decoration.

6. The immense size of the materials in the temple at Balbec, is, perhaps, greater than any employed in Egypt. In the quarry without the walls of the city, lies a stone 70 feet in length, and 14 feet square, wrought in shape of a parallelopipedon or six-sided figure, containing 14,138 cubic feet, and weighing upwards of 1000 tons.

7. Where Balbec's palaces and mansions rose,
And halls resounded with Arabic lore;
Her splendid temples in the dust repose,
And crowds promiscuous throng her streets no more.

8. The Chinese empire presents a great number of prodigious monuments of human labour, erected in a very distant period of antiquity. The great wall, built more than 2000 years ago, may be considered as the most stu-

pendous production of ancient industry remaining on earth.

9. The length of this wall is 1500 miles; its height about 25 feet, and its thickness 15 feet. It is carried over mountains 5000 feet high, and is supported over several large rivers by arches. A tower or bastion is situated on the top of the wall every hundred yards. It was built in order to secure China from the hostile incursions of the Tartars.

10. Amongst the numerous works of antiquity found in the Asiatic countries, the excavated temple at Elephanta in Hindostan, deserves to be noticed. This cave is sculptured out of a solid rock, and is 120 feet square; it contains four rows of massy pillars, resembling fluted balustrade, resting on a long rectangular plinth; the whole pillar is surrounded by a broad projecting capital, in form of a flat vase, richly and highly decorated.

11. Colossal statues and busts protrude from the side of the cavern, bearing sceptres, trophies, and symbols of their mythology. Columns, of an octagonal shape, are sometimes mounted on the backs of elephants, horses and tigers, supporting a cornice decorated with human figures sitting cross-legged.

12. A gallery extends from pillar to pillar, profusely sculptured with men in acts of devotion to serpents, tigers, and other animals. The base of the column, bearing an elephant, sometimes displays a man astride his trunk, which give the general mass the appearance of being put in motion by these mighty animals.

13. The whole may be considered as original, and peculiar to the habits of an uncivilized people, intuitively representing natural objects of their religious devotion in crude, disproportioned sculpture.

14. Persia abounds with objects of antiquity; the principal of which may be reckoned the ruins of Persepolis. This magnificent palace originally consisted of 205 columns, 70 feet high.

15. The arrangement, construction and proportions of

Persepolis, differ very materially from the Indian or Egyptian style of building; yet we find the Egyptian doors at its entrance, and the Indian sculptured excavations in the tomb of Darius.

16. The ancient Egyptians have left to the admiration of posterity, 5 palaces and 34 temples, as monuments of their science and industry upwards of 3000 years ago. Their pyramids may be considered as the most stupendous works of human labour.

17. There are several pyramids in Egypt, but those of Giza are the most gigantic: and the most enormous, or the great pyramid, is situated near Memphis. Herodotus says he was informed that the latter covered the remains of Cheops, and another adjoining, those of his brother Cephrenes, who succeeded him: the first only having inward galleries, or passages.

18. Although much dependence cannot be placed upon the accounts of this ancient writer, it seems highly probable that one hundred thousand men may have been constantly employed twenty years in erecting the immense pile.

19. The form of this lofty monument prevents an accurate measurement of its dimensions, without severe labour and imminent danger; consequently, those authors who gave them might have judged from mere conjecture.

20. Herodotus mentions its reputed height in his time to have been 800 feet, and the width of each side at the base the same. Strabo made it 652 feet; but Diodorus reduces it to 600: modern observers have agreed with Strabo.

21. One cause of the difference between the assumed heights, is, that the pyramid is measured or observed on different sides; the north-east angle is most frequently ascended, being the least damaged, but this part is exposed to the desert of Lybia, whence vast quantities of sand are driven by the wind against it, and the number of visible gradations are diminished by its accumulation; it is, therefore evident, that the admeasurements should

be made at the opposite angle, where it is probable that the rise of the earth is less considerable: and yet to arrive at any degree of accuracy, that should be ascertained by digging.

22. Strabo mentions, that the stone which closed the entrance to the apartments within the pyramid, was situated nearly half way up one of the sides. Were this the fact, a very great rise in the neighbouring earth must have occurred, as it now appears to be not more than 100 feet from the base.

23. In turning our attention to the antiquities of Europe, we find that the most interesting remains of ancient labour are of Grecian origin. Amongst the numerous relics of art may be noticed the Parthenon at Athens.

24. This magnificent temple is situated on the summit of the rock of the citadel, within the Acropolis, which appears as if nature had formed it as a pedestal for the express purpose of supporting it upon its crown. Its extreme length is 225 feet, and breadth 100 feet, surrounded by 46 columns, supporting an entablature of 12 feet in height. It exhibits a great variety of figures emblematical of the Grecian mythology.

25. The blocks of stone with which the columns are formed, are six feet in diameter, and so nicely and accurately wrought, that the most strict scrutiny is required to discover the joints, being no thicker than the finest hair.

26. Chateaubriand, seated on a fragment at the summit of the Acropolis, describes the ruins of the Parthenon with all the enthusiasm of a poet and an artist: "From the summit of the Acropolis, I beheld the sun rise between the two peaks of Mount Hymettus.

27. "The crows, which built their nests around the citadel, but never soar to its summit, hovered below us; their black and polished wings were tinged with the roseate hues by the first radiant beams of Aurora. Columns of light blue smoke ascended in the shade along the side of the Hymettus.

28. "Athens, the Acropolis, and the ruins of the Parthenon, were coloured with the most beautiful tints of peach blossom. The sculptures of Phidias, struck horizontally by a ray of gold, started into life, and seemed to move upon the marble, from the mobility of the shadows of relief."

29. Adjacent to the Parthenon stands the temple of Neptune, and Minerva Polias, the temples of Thesus, Prophylea, and Jupiter Olympus, which latter was composed of 128 columns, 60 feet in height; the distance round this temple is said to be half a mile. The walls of the city of Athens extended over a space of nine leagues, and were broad enough to admit two chariots to run abreast.

30. In Italy the traveller meets with numberless objects of antiquity, which furnish sufficient proofs of the correctness of our historical details of the ancient splendour and magnificence of the Roman commonwealth. Rome itself may be considered as a city of antiquities.

31. The works of the Romans were much more numerous than those of any other people. The remains of their palaces, theatres, amphitheatres, baths, mausoleums, and other works, excite at this day the admiration and astonishment of every judicious beholder.

32. The plans of their buildings were more varied than those of the Greeks, who, excepting but in a few instances of small but beautiful specimens, erected their principal edifices upon rectangular plans.

33. The Romans constructed circular temples crowned with domes, amphitheatres upon elliptic plans, and their theatres and many other buildings, upon a mixed-lined plan. By this variety they formed a style that was both elegant and magnificent.

34. In the cities of Pompeii and Herculaneum, which were overwhelmed by the volcanic eruption of Mount Vesuvius in the 79th year of the Christian era, an almost endless variety of objects are found to gratify the researches of the curious.

35. In those subterraneous mansions, once the abodes of human life; enjoying the clear light of heaven, but now the gloomy caverns of solitude and darkness, the inquisitive traveller, led only by the light of a taper, explores the habitations, and even the household furniture, of those who existed in a high state of civilization nearly two thousand years ago.

36. Antiquities of Roman origin are often found in Great Britain, and in most of the southern parts of Europe. In Spain, the works of the Romans are very conspicuous. The aqueduct at Segovia is a noble edifice, consisting of 159 arches, extending about 740 yards, and is rather more than 94 feet in height where it crosses the valley.

37. Morviedo, the ancient Saguntum, and Tarragona, the ancient Tarraco, affords many curious remains of antiquity. The theatre is capable of receiving 10,000 people, and is hewn out of a solid rock. The labour of which was less than might at first have been expected, as the Spanish rocks are generally calcareous or of gypsum.

38. Medals and coins of the ancient civilized nations of Europe, Asia, and Africa, have been found in great varieties. They contribute in no small degree to enrich the cabinets of the curious, and serve as the lasting gazettes of antiquity by giving data to many facts which history has left in obscurity.

39. Medals inform the world that at such a period a monarch ascended the throne, a victory was achieved, the foundation of a city was laid, a temple erected, or some other important event occurred.

40. Coins of the greatest antiquity were rude and shapeless, and without impressions or devices. The silver coins of Greece, first known as bearing marks, are those with a tortoise on one side, and indented on the other: it is extremely doubtful when these coins were made, but they are supposed to have been from the celebrated mint of Ægina, where, according to some writers, the coinage

of money took place by command of Phidon, king of the Argives.

41. But succeeding coins of different nations, from their style of execution, bear testimony to the improvement of those people with whom they circulated. The ancient coins frequently exhibited on one side, the portrait or bust of some king or emperor. In some instances the arms or hands were introduced, as bearing emblems of power. The devices on the other side were extremely various.

42. As medals and coins present an infinite variety of objects, they consequently afford a proportionate degree of pleasure in the study of them. Indeed there is scarcely any peculiarity in the manners, dress, or religion of the ancients, which they do not illustrate and explain.

43. In the two continents of America, the relics of ancient labour, peculiar only to a people somewhat advanced in arts and civilization, are not unfrequently discovered. But they appear of a less interesting nature than those of some other countries. In America, the antiquarian explores but a barren field; or at least one which is unproductive in the objects of his research.

44. As history gives us no account of the people to whom the American antiquities owe their origin, he can only reflect on them with conjecture. To attempt an illustration of them would be like travelling in the dark without a guide.

DRAWING.

Drawing is the art of expressing with accuracy the outline or true boundary of objects of every description, on any plane or superfice.

2. This pleasing method of preserving the forms of persons and places, long after the original ones have perished, or entirely changed, has been cultivated from

the most remote antiquity, and received many improvements, which were frequently lost and recovered through the temporary patronage and neglect of the rich, under whose auspices only, the art of drawing can ever flourish.

3. To form a just conception of the earliest state of drawing, it will be necessary to recur to the distorted forms produced by man in an uncivilized state of nature, in which we may discover genius struggling with ignorance, and always without success; such were the productions of the first population of the world, and such are the productions of youth in all ages, before the kind hand of experience has pointed out the paths of correctness and taste.

4. In order to acquire a knowledge of this art, the student should begin his operation with the greatest caution, acquiring a thorough knowledge of geometry and the laws of perspective, which will enable him to comprehend the various circular forms adopted by nature, and the peculiar shape they assume when placed in particular positions.

5. To proceed regularly and methodically, the learner should be provided with wove paper, or in other words, drawing paper, with a smooth surface.

6. As paper when wet becomes uneven, it is necessary to stretch it during the operation of colouring, by means of a drawing board. The most convenient one is composed of a square frame with a moveable pannel, on which the paper is laid wet, then pressed into the frame and secured by wedges on the back, when it will dry perfectly even, and become fit for use.

7. The principal instruments used in drawing are, compasses for ascertaining distances between lines, forming circles, taking measurements by scale, &c. and a steel pen for drawing very fine lines; a parallel ruler, by which, when open, lines drawn along the outward half must be parallel with the half held firm on the paper, and a rule or square, so contrived as to supercede the above on the drawing board, by applying the stock or shortest end, to

the edge of the board, where it is slid backwards and forwards, and the long part used for tracing the lines.

8. The drawing is sometimes made with chalk, but generally with black lead pencils, which should always be of the best quality. Indian rubber is usually employed in clearing off superfluous marks of the lead pencil, and from its elastic adhesive property, it is very useful in removing dirt or blemishes from the paper. Indian ink is another valuable material, brought from China, where the secret of making it remains.

9. The next and most important article to be considered is the hair pencil. The Chinese, who use the Indian ink for writing, with a brush, make very elegant pencils with hair, drawn through a reed; but the most common pencils are made with camels hair, inserted in various sized quills. If they form a point without separating, they are fit for use.

10. Prepared with the apparatus already enumerated, the student must confine himself to the copying of single subjects, and by no means attempt groups of objects, as the eye, more rapid than thought, will wander over them and confound his ideas, not yet taught the faculty of discrimination; to attain this faculty, it is absolutely necessary to advance progressively.

11. The learner should begin with the geometrical figures of arches, circles, ovals, cones, cylinders, and squares; all of which, except the latter, have an evident resemblance to the forms of nature, and accurately attain the shading which produces their rotundity, convexity, angles, and parts most remote from the eye.

12. Grapes detached from, or adhering in clusters to the vine, and many other fruits with their leaves, furnish excellent hints for the acquiring of graceful turns, and the art of placing justly, strong, direct, and reflected lights. These require no rules or directions whatever, even in the colouring, as the tints may be composed from the originals.

13. There are several useful rules to be observed in

drawing a truly proportioned head and face; the former contains four equal parts, measuring from the crown to the upper part of the forehead, to the eye-brows, to the lower part of the nose, and to the chin.

14. The first step towards forming a full face, is to form an oval, through which, make a perpendicular line, and a second across the centre, then divide the former into four equal parts, the first is to include the hair, the second the forehead, the third the nose, and the last the lips and chin.

15. The transverse line is to be considered five times the length of the eye, one length of which is to be left for the space between the organs of sight; the ears should never be higher than the eye-brows, nor lower than the nose; the mouth is the length of the eye, and the middle of it must be on the perpendicular line, and the exterior of the nostrils ought to extend beyond the inner corner of the eyes.

16. *Perspective drawing.* Perspective is the foundation of all the polite or liberal arts that have their basis in drawing; though colouring, taken abstractly, does not come within its rules, yet the painter, as well as the sculptor and architect, cannot but derive essential advantage from a knowledge of perspective.

17. By perspective we are taught to delineate objects on a plane, upon geometrical principles, and in exact ratio with their several magnitude, governed by their distance. But it is not in the power of art to represent any single figure exact, as it appears in nature, on a plane, except it be a circle; and then the point of sight, or direct position of the eye must be central. The reasons for this are obvious; every object that recedes from the eye, (such as a row of houses in an oblique direction) inevitably require that its more remote parts should be represented as being of less magnitude than those more in front, or nearest to the spectator.

18. Original planes or lines are the surfaces of the ob-

ject to be drawn, or they are any lines of those surfaces; or it means the surfaces on which these objects stand.

19. Perspective plane is the picture itself, which is supposed to be a transparent plane, through which we view the objects represented thereon.

20. Vanishing planes are those prints which are marked upon the picture, by supposing lines to be drawn from the spectator's eye to any original lines, and produced until they touch the picture.

21. Ground plane is the surface of the earth, or plane of the horizon on which the picture is supposed to stand. The ground line is that formed by the intersection of the picture in the ground plane.

22. The horizontal line is the vanishing point of the horizontal plane, and is produced in the same manner as any other vanishing line, viz. by passing a plane through the eye, parallel to the horizontal plane.

23. The point of sight is the fixed point from which the spectator views the perspective plane.

Vanishing points are the points which are marked down in the picture, by supposing lines to be drawn from the spectator's eye, parallel to any original lines, and produced till they touch the picture.

24. *The camera obscura* makes the most pleasing representation of nature hitherto discovered, by which the external objects are reflected on any plane within the chamber, in the liveliest colours, and in their proper motions.

25. The portable camera obscura resembles a wooden box or chest, furnished with a circular or angular projection in the middle, opening from it, and to be directed towards the landscape; beyond this aperture and within the box, is placed a mirror inclined 45 degrees, serving to reflect the exterior rays on a convex lens, set in a tube, and the light streaming from this will convey the true forms and colours of the landscape to a paper situated at a proper distance to receive them.

26. This beautiful picture is viewed through an oblong

rture; and may be copied with equal facility and ad-
tage; indeed, the most experienced artist may obtain
ts from the camera obscura, which might escape his
ce in drawing from reality.

PAINTING.

Daughter of genius! what displays are thine!
What pleasing wonders have thy pencils wrought!
Departed scenes, with those the dust enshrine,
Before our view, in living forms are brought.

THE art of painting may not improperly be defined, a
le of conveying ideas to the mind, by means of a repre-
ation of the visible parts of nature.

. It is a language by which many things may be ex-
ised in a stronger and clearer manner than can be ef-
ed in any other way; and to a certain extent it may
lenominated a universal language, though it is only in
portion as we are accustomed to read it, that we can
uire correct ideas through its means.

. The particular education of our senses or organs, is
oubtedly the only mode by which those senses can be
lered serviceable to us in their full extent; for although,
heir natural and uncultivated state, they are unable to
ent us with clear and distinct ideas of things of a sim-
kind, or which differ from each other, it is far other-
: when we expect from them just ideas of things com-
ated, or such as differ from each other by small, or al-
t imperceptible gradations.

. The untutored eye readily distinguishes black from
te, red from blue, and purple from green; but it is un-
to detect the delicate transition from one shade to
her of the same colour, and still less the nicer varia-
s of combined and complex colours.

. The quickest of all operations is, perhaps, that of
t, and in one moment we are enabled to see many

objects; but we cannot observe, distinguish, and understand clearly, more than one at a time.

6. Upon the first sight of the page of a written or printed book, though we observe it to be full of words, we do not discover the sense contained in it. To understand, we are obliged to read it.

7. In like manner we are obliged to read every part of a picture in order to ascertain its true import, expression, and the style of its execution. And it would be almost as absurd to pronounce at first sight, an irrevocable sentence on an extensive and studied production of the pencil, as it would be to exercise the duties of criticism on the sentiments advanced in a written composition, without knowing what they were.

8. Invention, composition, design, expression, colouring, and the distribution of light and shade, may, perhaps, not improperly be termed the great component parts of painting, unless it be insisted that invention is rather the parent and director of the others to the proper objects of their attainment.

9. *Invention* consists of three things; first, the choice of a subject properly within the scope of the art; secondly, the seizure of the most proper moment for representation; and lastly, the discovery and selection of such objects and such incidental circumstances, as combined together, may best tend to develop the story, or augment the interest of the piece.

10. The judicious disposal of the materials furnished by the imagination, or invention, in such a manner as best to contribute to the beauty, the expression of the picture, constitutes what is termed composition in painting.

11. And here we must observe, that the different parts of the art, before mentioned, are so intimately connected with, and dependent on each other, that the separate discussion of them must ever be attended with difficulty.

12. *Composition* is more especially inseparable from the rest, as not only the necessary expression of the subject and the forms and disposition of the groups, but like-

vise the consequent lights and shades resulting from such orms and distributions, the contrast and variety of the characters, and even the principal masses of colour, all, in a ertain degree come under the consideration of the artist, ven when making his first sketch.

13. *Design.* The most perfect knowledge of form, only onstitutes a part of that branch of painting which is ermed design; the art of foreshortening, by which a limb r figure, although occupying a diminished space on the anvass, is rendered, in appearance, of its full length and nagnitude, is an equally indispensible object of the artist's ttainments.

14. The sculptor, when he has chisselled or modelled he form of his figure or group, with its first proportions, as completed his work, which is rather the simple tranicript than the imitation of the image previously formed n his mind; his art is undisguised and without illusion; t presents as well to our touch as to our sight, the bodies nd shapes of things, without the colour.

15. The distinguishing prerogative of painting, on the ther hand, and that from which arises its decided adantage over every other artificial mode of representaion, is its power to give upon a limited plane, the appearance of boundless space.

16. *Expression;* Chiaro-scuro, is a term used to reresent the art of distributing the lights and shades, in a picture, in such a manner as to give at once, proper elief to the figures, the best effect to the whole composiion, and the greatest delight to the eye.

17. A thorough knowledge of the effect of light and hade, is of the greatest importance to a painter, as it is hiefly by the proper application of this branch of the rt, that he is enabled to make the various objects in his icture appear to project or recede, according to their elative situations or distance; and thus far, indeed, the rinciples of it are necessary to the artist, ere he can hope o render his imitation just or intelligible.

18. *Colouring* is the art of giving every object in a

picture, its true and proper hue, as it appears under all the various circumstances or combination of light, middle light, and shadow; and so blending and contrasting the colours, as to make each appear with the greatest advantage and beauty, at the same time that it contributes to the richness, brilliancy, and harmony of the whole.

19. Simplicity with variety, inequality of parts, with union in the whole, are, perhaps, the basis of all those effects in painting which give pleasure to the sight.

20. As in composition one group, or one figure, should strike the eye with superiority over the secondary groups, or other objects in the picture, so there should be in a picture one principal mass of light, which, however connected with others, should still predominate; and for the same reason no two colours should have an equal sway in the same picture.

21. As by the addition of smaller portions of light connected with the principal mass, that mass acquires at once, breadth and influence, so the unity of action in a composition, is in many cases, powerfully augmented by a repetition of nearly the same action in two or three of the figures arranged together.

22. *Contrasts.* The doctrine of contrasts is equally applicable to composition, to light and shade, and to colouring. As in composition the too frequent contrasts of lines, or of back to front figures, is destructive of simplicity and force of expression; so the inordinate and frequent introduction of strong oppositions of lights and shadows, or of colours, produces a confused appearance, wholly subversive of breadth and grandeur of effect.

23. The moderate and judicious use of contrasts is of the greatest use; it gives a zest to the picture, and is like the discord in music, which sheds additional sweetness to the full harmony which succeeds it.

MUSIC.

[usic, whether cultivated as a science or enjoyed as
tural blessing to man, seems to be an object of uni-
al love. And every heart of sensibility finds it a
ce of exquisite and innocent delight. From its preva-
e in every age, and in every part of the world, it
as as if there was something in the "concord of
et sounds," congenial with the mind of man.

. Among rude and unpolished nations it has ever
en to peculiar importance, and been introduced to aid
passions of joy and grief upon all solemn and festive
sions.

. It has ever been the solace and delight of men of
us, and there is no subject which is praised with more
nt expressions, or expatiated upon with more de-
t by Homer, Tasso, Milton Darwin, and Shakspeare.
heers the traveller as he pursues the journey of life,
produces an innocent and sweet oblivion of his toil.

. For a description of the powers of music, resource
best be had to the sister art, to which sounds are so
uently indebted for the most pleasing alliance of sense;
perhaps it will not be found easy to produce a short
ription of its application to the various situations of
and different feelings of the heart more beautiful and
than the following lines.

5. "Queen of every moving measure,
Sweetest source of purest pleasure,
Music! why thy powers employ
Only for the sons of joy?
Only for the smiling guest,
At natal or at nuptial feast?

6. Rather thy lenient numbers pour
On those whom secret griefs devour;
Bid be still the throbbing heart
Of those whom death and absence part;
And with some soft consoling air
Smooth the brow of dumb despair."

7. As the notes used to express any sensation may be in equal unison with those of a similar nature, music requires the aid of language to characterize any individual passion.

8. If corresponding words are the associates of sound, they become by this alliance specific indications of the manners and passions; and the pleasure conveyed to the ear is attended by the more refined gratifications of the understanding.

9. Mysterious as the mode of the operation of sound may be, it is clear that nature has connected certain emotions with them, and their effects are sufficiently ascertained and deeply felt; for they are the keys which unlock all the passions of the soul.

10. Sounds variously modified, and judiciously combined with words, can melt with pity, sink in sorrow, transport with joy, rouse to courage, and elevate with devotion. They have a peculiar effect in cherishing the tender passions and calling up the long forgotton images of the past, with their attendant train of associated ideas.

11. How oft has music soften'd human woes,
And caused to flow the joy-begotten tear;
How often charm'd rude passions to repose,
With thrilling sounds, molifulent and clear.

12. When moon and stars their lucid smiles display
And all is calm beneath the evening shade;
What joy to listen to the magic lay,
The social concert, or the serenade.

13. Come child of genius, lend thy pow'r awhile,
And ev'ry tender sympathy excite;
With thy smooth numbers, all my cares beguile,
And fill my soul with visions of delight.

14. While the ear is delighted with the strains of harmony, the fancy is busied in the contemplation of the most effecting images, and the whole soul is exalted to the brightest regions of joy and happiness.

15. The infancy of almost every art and science is involved in impenetrable obscurity. In tracing their early

progress we are presented with innumerable difficulties which render the study of the antiquarian irksome to himself, and useless to society.

16. In respect to the music of antiquity, all at present is fable or conjecture, the few documents that have survived the eruption of the northern nations tending to embarrass rather than to elucidate our inquiries.

17. The system of harmony adapted to the ancient Greeks was most probably invented or at least brought from Egypt, at that time the abode of elegance and refinement, by Pythagoras, a name sufficiently known and revered; but his system, however excellent, is now irretrievably lost.

18. It were useless, therefore, to enumerate the names of those who are said to have followed and improved upon his original ideas; for, in all instances where there are no circumstances which constitute characters and familiarize us with the persons spoken of, we naturally inquire "who were they," and for want of farther information become indifferent of what is recorded of them.

19. From various circumstances it is conjectured that the music of the ancients was of a very simple and artless description, and greatly inferior to the performances of the present day.

20. "Ancient Greece," says M. Dacier, "had many musicians who were not poets. But not one poet who was not a musician, and who did not compose the music of his piece; for in Greece music was the foundation of all sciences; the education of children was begun by it, from a persuasion that nothing great could be expected from a man who was ignorant of music.

21. This probably gave the Greek poetry such a superiority over Italian; for at Rome, poetry and music were two distinct sciences, and poets were there obliged to give their pieces to be set by musicians."

22. The admirable Metastasio, a man of the world, of eloquence, and refinement, a poet and a musician, was compelled to restrain his natural propensity for the sci-

ence of harmony; candidly confessing, that the stu of modern music required too much time for a man of l ters ever to be able to qualify himself for the business a composer.

23. The Greeks indeed, during the time of their ed cation, had no language to learn but their own; her they had more time for other studies.

24. But notwithstanding the simplicity of their mus the poets themselves being able to set their own piec and to sing them so well to the satisfaction of the publ it is a certain proof that their music had not only few difficulties, but fewer excellencies than the modern.

25 Music is written on what is called a *stave*, consi ing of five parallel lines: when more than five lines a used, the additional short lines are called ledger lin The lines are divided by what are denominated ba which represent the equal divisions of time to be observe

26. The first seven letters of the alphabet are emplo ed in music to represent the regular gradation of soun from the lowest to the highest tone; and the contrary. The lowest note is placed upon the first line at the bottc of the stave; the next higher upon the first space, and t next upon the second line, and rising in like manner to t highest sound.

27. The characters exhibited at the bottom of the opp site page, are the principal ones employed in music. T first is the C cliff, which is always placed upon the seco line of tenor, treble and counter. The second is the F cli which occupies the fourth line in bass; and in raising th notes, it will be seen that those upon the fourth line bass are the same in sound as the notes upon the seco line, in either of the other parts: being one octave, or th eighth sound above the lower line in bass. The cliffs a always placed at the beginning of a tune.

28. The next six characters after the cliffs are th notes of music. The first is the *semibreve*, the longe note. In modern music, it is considered equal to a whc bar of common time. The second note is the *minim*, equal

half a semibreve; the third is the *crotchet*, equal to half a minim, or the fourth part of a semibreve; the fourth the *quaver* equal to half a crotchet, or the eighth part of a semibreve; the fifth the *semi-quaver*, equal to half a quaver, or the sixteenth part of a semibreve. The sixth note is the *demi-semi-quaver*, which is equal to half a semi-quaver, or the thirty-second part of a semibreve, and is the shortest note.

29. The *bar* is the straight mark crossing the lines of the stave. The next six characters after the bar, are the *stops* or rests. The first is the semibreve rest, being equal in time to the semibreve; the second is equal in time to the minim, the third to the crotchet, fourth to the quaver, &c. The characters after the second bar are, first the *flat;* second the *sharp;* third the *natural;* fourth consisting of four dots, a *repeat.*

30. The first character on the lower stave denotes the first mood of *common time*, which is equal to one semibreve or three seconds to every bar. The next character denotes the second mood, which is equal to one semibreve, or its quantity and three seconds of time to every bar. The third character, the third mood, which is equal to one semibreve, or two seconds of time to the bar. The fourth mood represented by two and four contains one minim, or its quantity and one and a half second of time to the bar.

31. The three and two signifies the first mood of *triple time*, which contains one pointed semibreve, or its quantity and three seconds of time between every bar.—

The second mood is denoted by the numbers three and four, and contains one pointed minim to the bar and two seconds of time. The third mood denoted by three and eight contains one pointed crotchet, or its quantity of time to the bar, and a second and a half of time.

32. *Compound time* has two moods, the first is represented by six and four, and is equal to one pointed semibreve to the bar, and two seconds of time. The second by six and eight, and is equal to one pointed minim to the bar, and one second and a half of time. The next character is called a *close*, and is always placed at the end of a tune.

33. A dot at the right hand side of any note, signifies that the note is to be sounded one half as long again. A slur unites such notes as are sung to one syllable. A double bar signifies the end of a strain, and also a repeat.

34. The characters denominated sharps and flats are frequently employed in music. The former when placed before a note raises it half a tone higher than its usual sound, and the latter sinks it half a tone lower. A natural restores a note to its original sound.

35. The key note is a certain given sound or tone by which all other notes in a piece of music are regulated. There are two keys, the major and the minor; the major key is applied to music of a brisk and lively air, and the minor, on the contrary, is adapted to a more plaintive and serious kind of melody.

36. There are many other terms and definitions necessary to be known before a competent knowledge of the science of music can be obtained. But it would be trespassing on the limits of the present work to give them all in detail. What has already been advanced may serve as an introduction to this interesting study.

37. The notes of music form a kind of universal language; for, being in general use, they are equally familiar to all civilized nations; hence it is not uncommon to see several persons, who can barely make themselves understood by speech, unite in a concert, and proceed in their several parts with surprising facility and precision.

38. The Italians for a long time had the lead in this fascinating science; and such was the rage for the compositions of Italian masters, that immense quantities of music, composed by professors of other countries were ushered into the world with Italian indications; by which means they obtained a welcome, and sometimes a celebrity, that would have been denied them, had their origin been discovered. Such is the effect of opinion, that merit is sometimes obliged to disown her native soil.

POETRY.

Poetry may be defined as an imitative and creative art; the energies of which, are exerted by means of words harmoniously arranged, in measured numbers.

2. Dr. Blair has observed, that it is not so easy as might at first be imagined, to ascertain with minute precision, wherein poetry differs from prose.

3. In point of fact, every reflecting reader must be sensible, that it is difficult to determine the precise line where different shades of colour terminate, or even the boundaries of animal and vegetable nature; so it is a matter of no small nicety to fix the point where composition rises from the scale of prose to that of poetry.

4. The historian, the orator, and the philosopher, address themselves for the most part, primarily to the understanding: their direct aim is to persuade, or to instruct. But the primary aim of the poet is to please and to move, and therefore it is to the imagination, and the passions, that he speaks.

5. He may and he ought to have in view to inform; but it is indirectly, and by pleasing and moving that he accomplishes this end.

6. It has been said that man, by nature, is both a poet and a musician. The same impulse which prompted the enthusiastic poetic style, prompted a certain melody, or

modulation of sound, suited to the emotion of joy or grief, of admiration, love or anger.

7. There is a power in sound, which, partly from nature, and partly from habit and association, makes such pathetic impression on the fancy, as delights even the most wild barbarians.

8. During the infancy of poetry, all the different kinds of it lay confused, and were mingled in the same composition according as inclination, enthusiasm, or accident directed the poet's strain.

9. Odes and hymns of every sort, would naturally be among the first compositions; according as the bards were moved by religious feelings, by exultation, resentment, love, or any other sentiment, to pour themselves in song.

10. Plaintive or elegiac poetry, would as naturally arise from lamentations over their deceased friends. The recital of the achievements of their heroes, and their ancestors, gave birth to what we now call epic poetry; and as not content with simply reciting these, they would infallibly be led, at some of their public meetings, to represent them by introducing different bards, speaking in the characters of their heroes, and answering each other; we find in this the outlines of tragedy, or dramatic writing.

11. None of these kinds of poetry, however, were in the first ages of society properly distinguished or separated, as they are now, from each other.

12. *Versification.* Nations whose language and pronunciation were of a musical kind, rested their versification chiefly upon the qualities, that is, the length or shortness of their syllables.

13. Others, who did not make the quantities of their syllables be more distinctly perceived in pronouncing them, rested the melody of their verse upon the number of the syllables which it contained, upon the proper disposition of accents and powers in reciting it, and frequently upon that return of corresponding sounds, which we call rhyme.

14. *Poetical feet.* A certain number of connected syl-

lables forms a foot. These syllables, thus connected, are called *feet;* because it is by their aid that the voice, as it were, steps along through the verse, in a measured pace; and it is necessary that the syllables which mark this regular movement of the voice should, in some manner, be distinguished from the others.

15. An essential circumstance in the construction of our verse is the ceasual pause, which falls towards the middle of each line. The pause may fall after the fourth, fifth, sixth, or seventh syllable; and according as the pause is placed after one or other of these syllables, the melody of the verse is much changed, its air and cadence are diversified. By this means uncommon richness and variety are added to English versification.

16. When the pause falls earliest, that is, after the fourth syllable, the briskest melody is thereby formed, and the most spirited air given to the lines. In the following lines of the Rape of the Lock, Mr. Pope has, with exquisite propriety, suited the construction of the verse to the subject.

17. On her white breast||a sparkling cross she wore,
Which jews might kiss||and infidels adore;
Her living looks||a sprightly mind disclose,
Quick in her eyes||and as unfixed as those,
Favours to none||to all she smiles extends,
Oft she rejects||but never once offends.

18. When the pauses fall after the fifth syllable, dividing the lines into two equal portions, the melody is sensibly altered: as

Eternal sunshine||of the spotless mind,
Each prayer accepted||and each wish resigned.

19. When the pause follows the sixth syllable, the verse marches with a more slow and measured pace than in either of the two former cases; as for example,

The wrath of Peleus' son||the direful spring
Of all the Grecian woes||O goddess, sing!

20. But the grave solemn cadence becomes still more sensible, when the pause falls after the seventh syllable, which is the nearest place to the end of the line that it can occupy.

21. The following may serve as an example.

> And in the smooth description||murmur still
> Long-lived, adored ideas||all adieu!

22. *Blank verse.* Our blank verse possesses great advantages, and is indeed a noble, bold, and disencumbered species of versification. The principal defect in rhyme, is the full close which it forces upon the ear at the end of every couplet.

23. Blank verse is freed from this, and allows the lines to run into each other with great liberty. Hence it is particularly suited to subjects of dignity and force, which demand more free and manly numbers than rhyme. Milton is unrivalled in this kind of poetry. The following is from his Paradise Lost.

> 24. . . . . Now storming fury rose,
> And clamour, such as heard in heav'n till now
> Was never; arms on armour clashing bray'd
> Horrible discord, and the mad'ning wheels
> Of brazen chariots rag'd; dire was the noise
> Of conflict; over-head the dismal hiss
> Of fiery darts in flaming vollies flew,
> And flying, vaulted either host with fire.
> 25. So under fiery cope together rush'd
> Both battles main, with furious assault
> And inextinguishable rage; all heaven
> Resounded; and had earth been there, all earth
> Had to her centre shook.

26. *Pastoral poetry.* The object of pastoral poetry, is to delight the imagination with the descriptions of the beauties of nature and of human life spent in the midst of these beauties, and persons possessing health, sensibility and innocence, and undisturbed by the anxieties and cares of business and activity.

27. The following lines, by Shenstone, may serve as a very good specimen of pastoral poetry.

One would think she might like to retire
To the bow'r I had laboured to rear;
Not a shrub that I heard her admire,
But I hastened and planted it there.

Oh! how sudden the jessamine strove
With the lilac to render it gay;
Already it calls for my love
To prune the wild branches away.

28. I have found out a gift for my fair,
I have found where the wood-pigeons breed;
But let me that plunder forbear,
She will say 'twas a barbarous deed.

For he ne'er could be true she averr'd,
Who could rob a poor bird of its young;
And I lov'd her the more when I heard
Such tenderness fall from her tongue.

29. *Lyric poetry.* Lyric poetry is susceptible of different ornaments, suitable to the nature of the subjects of which it treats. It admits sometimes of the boldest and warmest figures of imagination and passion; at other times, it delights in the pleasant and playful images of fancy and feeling.

30. Sometimes the expression is ardent, concise and vehement; at other times, it is simple and diffuse; but at all times, it must be pure, picturesque and correct.

31. In lyric poetry, the author may assume any tone he chooses; he may be sublime, familiar, gay, serious, passionate, moral, tender, or witty, with equal propriety, and he may even mix several of these strains in the same poem.

32. *Didactic poetry.* This kind of poetry is applied to the discussion of useful science, some beneficial art, or some system of prudential or moral conduct, by which the reader may improve his knowledge, his wisdom, or his

virtue; and it recommends the discussion by all the merit of imagination, and all the charms of poetical composition.

33. It collects all the best theories and most approved practices, and arranges them, with the reasons of them, in that distinct and lucid order, in which they are most likely to make the deepest impression.

Pope's Essay on Man. from which the following is extracted, is an admirable work of this kind.

34. HEAV'N from all creatures hides the book of fate,
All but the page prescribed, their present state;
From brutes what men, from men what spirits know;
Or who could suffer being here below?
The lamb thy riot dooms to bleed to-day,
Had he thy reason, would he skip and play?
Pleas'd to the last, he crops the flow'ry food,
And licks the hand just rais'd to shed his blood.

35. Oh blindness to the future! kindly giv'n,
That each may fill the circle mark'd by heav'n
Who sees with equal eye, as God of all,
A hero perish, or a sparrow fall;
Atoms or systems into ruin hurl'd,
And now a bubble burst, and now a world.

36. Hope humbly then; with trembling pinions soar;
Wait the great teacher Death; and God adore;
What future bliss, he gives not thee to know,
But gives that hope to be thy blessing now.
Hope springs eternal in the human breast;
Man never is, but always TO BE blest.
The soul, uneasy, and confin'd from home,
Rests and expatiates in a life to come.

37. Lo, the poor Indian! whose untutor'd mind
Sees God in clouds, or hears him in the wind;
His soul proud science never taught to stray,
Far as the Solar Walk, or Milky Way;
Yet simple nature to his hope has giv'n,
Behind the cloud-topt hill a humbler heav'n;
Some safer world in depth of woods embrac'd,
Some happier island in the wat'ry waste;
Where slaves once more their native land behold,
No fiends torment, no Christians thirst for gold.

38. TO BE content his natural desire;
He asks no angel's wing, no seraph's fire:

But thinks, admitted to that equal sky,
His faithful dog shall bear him company.
Go, wiser thou! and in thy scale of sense,
Weigh thy opinion against Providence;
Call imperfection what thou fanciest such;
Say, here he gives too little, there too much.—
In pride, in reas'ning pride, our error lies;
All quit their sphere, and rush into the skies.
39. Pride still is aiming at the blest abodes;
Men would be angels, angels would be gods.
Aspiring to be gods, if angels fell,
Aspiring to be angels, men rebel:
And who but wishes to invert the laws
Of ORDER, sins against the ETERNAL CAUSE.

40. *Descriptive poetry.* Poetry of this kind is addressed chiefly to the imagination, though it attempts also to convey many useful impressions to the understanding, and to the heart.

41. In description, the great art seems to be, not to specify every minute particular, but to select the most striking and picturesque circumstances, which would naturally make the deepest impression on the mind of the beholder. The following picture of desolation, by Ossian, is conceived with much vigour of imagination.

42. "I have seen the walls of Balclutha, but they were desolate. The flames had resounded in the halls, and the voice of the people is heard no more. The stream of Clutha was removed from its course by the fall of the walls. The thistle shook there its lonely head; the moss whistled in the wind. The fox looked out from the window, and the rank grass of the wall waved round its head. Desolate is the dwelling of Morna; silence is in the house of her fathers."

43. Homer relates, that Achilles commands his domestics to prepare a vessel to heat water for washing the dead body of Patroclus, which they accordingly performed.—Nothing can be more simple than the language of the poet.

44. A massy chaldron of stupendous frame
They brought, and plac'd it o'er the rising flame;

They heap the lighted wood; the flame divides
Beneath the vase and climbs along the sides.
In its wide womb they pour the rushing stream,
The boiling water bubbles to the brim.

45. The author of Ildrim, a Syrian tale, in describing a pleasure garden, displays the most lively imagery, and copies nature with the glowing pencil of genius.

There, in that garden, eastern art display'd
All that enchants beneath a burning sky;
All that belong to coolness, or to shade,
Hues that enliven, or relieve the eye
Dazzled with light; rich odours that supply
The native sweets that loaded zephyrs bear;
Sounds that refresh with cooling melody.
Yet, matchless Nature, in that scene so fair,
Thine was the choicest gifts, though art arrang'd them there.

46. A marble pavement from the gateway spread
Its snowy surface, bordered on each side
With streams that water'd an enamelled bed:
A fountain in the midst; whose spiral tide
Display'd unnumber'd gems with sunbeams dyed,
That falling waken'd music's liquid sound.
The rest was verdure stretching far and wide;
Groves that o'erarch'd or scatter'd sweets around,
Flowers that enrich'd the air or deck'd the painted ground.

47. The branching walnut, prodigal of green,
The feathered palm, the cypress dark and old
Tower'd on high, with myrtle woods between;
Or bowers of citron, that at once unfold
Their flowers of silver, or their fruits of gold.
Aloft its giant leaf banana spread,
Waving in air, like Mecca's flag unroll'd;
While purple clusters, pendent overhead,
With yellow cassia's bloom an heavenly incense shed.

48. A poetical description resembles an historical painting, the merit of which, consists in communicating to the different figures, the same position and appearance that they hold in nature.

49. *Epic poetry.* Epic and dramatic poetry are universally allowed to be the most dignified, and at the same time, the most difficult species of poetic composition.

50. To contrive a story which shall please and interest readers, by being at once entertaining, important and ıtructive; to fill it with suitable incidents, to enliven it th a variety of character and description, and throughout a long work, to maintain that propriety of sentiment, d that elevation of style, which the epic character reıires, is unquestionably the highest effort of poetical nius.

51. The plain account of the nature of an epic poem the recital of some illustrious enterprize in a poetical rm. This is the exact definition of this subject.

52. As it is the business of an epic poet to copy after ıture, and to form a probable interesting tale, he must udy to give all his personages proper and well supported ıaracters, such as display the features of human nature. his is what Aristotle calls giving life to manners. The llowing, from Homer's Iliad, may serve as a specimen epic poetry. It relates to the second battle between e Greeks and Trojans.

3. Now had the Grecians snatch'd a short repast,
And buckling on their shining arms in haste,
Troy rous'd as soon; for on this dreadful day
The fate of fathers, wives and infants lay;
The gates, unfolding, pour forth all their train;
Squadrons on squadrons cloud the dusty plain;
Men, steeds, and chariots, shake the trembling ground,
The tumult thickens, and the skies resound,
And now with shouts the shocking armies clos'd,
To lances, lances, shields to shields opposed;
Host against host, with shadowy legions drew;
The sounding darts in iron tempests flew;
Victors and vanquished, join promiscuous cries,
Triumphant shouts and dying groans arise.

4. With streaming blood the slipp'ry fields are dy'd,
And slaughter'd heroes swell the dreadful tide;
Long as the morning beams increasing bright,
O'er heaven's clear azure spread the sacred light;
Commutal death, the fate of war confounds,
Each adverse battle gor'd with equal wounds;
But when the sun the height of heaven ascends,
The sire of Gods his golden scales suspends

With equal hand: in these explor'd the fate
Of Greece and Troy, and pois'd the mighty weight.
Press'd with its load, the Grecian balance lies;
Low sunk on earth, the Trojans strikes the skies.

55. Then Jove from Ida's top his horror spreads;
The clouds burst dreadful o'er the Grecian heads,
Thick lightnings flash; the mutt'ring thunder rolls;
Their strength he whithers, and unnerves their souls.
Before his wrath his trembling hosts retire,
The gods in terror, and the skies on fire.

LOGIC.

Logic teaches how to deduce reason from the nature and analogy of things, and employ it to the best advantage in our inquiries after truth.

2. As the necessity of our existence obliges us to think, and to arrange our thoughts in such a manner as to enable us to communicate with each other, we are habitually impelled to a conclusion that it is necessary to teach reasoning as an art.

3. In order to reason well, it is necessary that the nature of our perceptions and ideas and the notions or conclusions we draw from them should be well understood.

4. Logic, therefore, is a science of extensive occupation, which has its beginning in the constitution of things, and the process of the human intellect, and its practical termination in the structure, use, and application of language.

5. Its objects are no less than the universal acquisition of knowledge, and that mutual communication which constitutes a large part of the employment, and is the most distinguishing character of man.

6. The impressions made by external objects upon the senses, are called sensation, or ideas of sensation. The recollection, or remembrance of those sensations are simply called ideas.

7. The general notions which are produced in the mind by reflecting upon ideas, have been called ideas of reflection; but as they all grow out of the comparison of the first mentioned ideas, and so universally, in the last result employ propositions, it appears preferable to call them notions.

8. Logical writers divide ideas into simple and complex; but as we have no simple sensation, and can therefore, have no simple ideas, but by the artificial process of abstraction, the division seems useless.

9. The word complex here, signifies compounded, and the compounded nature of our ideas will practically depend, in a great measure, upon our choice or determination in the subject of our reasoning. Thus, a lemon is soft, fragrant, yellow, and acid.

10. If I throw a lemon against another, the attention will be chiefly directed towards the organ of touch; and its fragrance, its tint, and its acidity, will be abstracted or left out.

11. But the perfumer, the designer, and the chemist, would separately attend to those parts of the idea which were suggested by the organs of smell, of vision, and of taste.

12. And in this manner it is, that we may separate the simple ideas of a yellowness, acidity, and fragrance; though in nature, their causes never appear insulated and apart from those of all the other sensations.

13. Words being constructed and established by mere usage, are not only inadequate and contracted in their use, but equivalent and synonymous; that is to say, one word may be used to denote several distinct and different things; as when we speak of a beam of light, a beam of timber, or the beam of a pair of scales; or on the contrary, as when we speak of a house, a habitation, or a residence.

14. A *syllogism* is a term used by logicians; it consists of three propositions. In the first, called the major proposition, something is predicated of a general subject; in

the second, called the minor, the subject of the major becomes the predicate of a specified subject; and in the third, called the conclusion, the predicate of the general subject is applied to the specific. Thus, *major*, all men are fallible: *minor*, the pope is a man: *conclusion*, therefore, the pope is fallible.

15. The major and minor terms are often called the premises, and the minor is sometimes called the argument. The premises are supposed to be intuitive, or at least incontestible, and the conclusion is established upon the axiom, that whatever can be predicated or affirmed of a genius, may be predicated of every species comprehended under it; and the like of species and individuals comprehended under them.

16. The formerly received theory of logic, from the extent of its subtilties, appears more burdensome than useful, to the minds of those who direct their attention to its study.

17. The clearest and most instructive kind of logic is that in which the process of reasoning is directed by analogy, or the relation that one thing bears to another. The following brief selection from the logic of Condillac may serve as an illustration of this mode of reasoning.

18. *Analysis the method of nature.* It is by analysis only that accurate knowledge is to be acquired; how then do we learn it from nature herself?

19. I suppose a castle that commands a vast and luxuriant plain, over which nature has been pleased to spread abundance, where art has profited by the situations which it presents, to produce variety and embellish nature there still more.

20. We arrive in the castle at night. Next morning the windows are thrown open. But just as we have caught a glimpse of the prospect, they are closed upon us.

21. Though this plain was exhibited to us but for an instant, it is certain that we saw every object which it contained. But the first glance is not sufficient to give us a complete knowledge of that plain, that is, to make

s discern the particular objects which it contained; it s for this reason that when the windows were shut again, one of us would have been able to give an account of vhat he had seen. This is the way in which we look at nany things and learn nothing.

22. At length the windows are again thrown open, and re not to be closed as long as the sun is above the horizon. Ve again see, and for a long while, all that we had seen t first.

23. But if like men in ecstacy, we continue as in the irst instance, looking at the whole crowd of diversified bjects, when the night comes upon us, we shall know o more about them than we knew when the windows vhich had been opened were suddenly shut again.

24. In order, therefore, to obtain a due knowledge of hat plain, it is not sufficient to see it all at once; we nust see each of its parts, one after another; and instead f embracing the whole at one view, we must fix our attention on one object at a time, and such objects one after nother. This is what nature teaches us all.

25. It is, therefore, with the mind as with the eye, it ees a multitude of things at once, and we must not vonder at it, since all sensations of sight belong to the nind.

26. Thought is analysed in the same way as exterior bjects; we decompose in the same way; we retrace to urselves the parts of our thought in a successive order.

27. We perform this composition and decomposition, y conforming to the relations which things have to one nother, as being principal and subordinate, and because ve could not analyse a plain, if the eye did not embrace he whole of it, we should not be able to analyse our hought if the mind did not embrace the whole of it.

28. In both cases, we must see the whole at once, therwise we could not assure ourselves that we have uccessively seen all the parts.

29. *Analysis forms correct minds.* Every one of us can emark, that we know sensible objects only through the

sensations which each receives of them, the sensations represent them to us.

30. We distinguish as many species of ideas as we distinguish different sensations, and these ideas are either actual sensations, or they are but a remembrance of the sensations of what we have had.

31. When we acquire them by the principle of analysis, they place themselves with order in the mind; they preserve there the order we gave them, and we can easily retrace them to ourselves with the same exactness with which we have acquired them.

32. If I want to comprehend the power or structure of a machine, I shall decompose it, to study each part of it separately. When I have an exact idea of every part, I can put them together again in the same order in which they were at first.

33. What is it then to comprehend this machine? It is to have a thought compounded of so many ideas as there are parts in the machine itself; ideas which exactly represent each of them, and are disposed in the same order.

34. When I study in this method, which has no rival, then my thoughts offer to me distinct ideas only; and it is analysed of itself, whether I want to give an account thereof to myself or to others.

35. It is through analysis alone we ought to instruct ourselves. It is the simplest way, because it is the most natural. Analysis has made all discoveries; through it we again find all that has been found, and what is called the method of invention is nothing else but analysis.

36. *Artifice of reasoning.* Nothing is more simple than reasoning, when the data include all the known facts necessary to the discovery of truth. We cannot discover a truth but inasmuch as it is included in truths which are already known, and that of consequence, every question to be resolved, supposes data, wherein the known and the unknown are mingled together.

37. If the data, or admitted premises do not include all the known, which are necessary to discover the truth

the problem is insolvable. This is what we should first take into consideration.

38. Yet if we have all the known, we are conducted, by a clear and precise language, to the solution we seek. We should, however, suspect that we have not all the requisite knowledge, when we use an obscure and confused language, which leads to nothing.

39. We should, therefore, endeavour to speak more correctly, in order to reason better, and we should learn how much these two things depend upon each other.

40. There are, therefore, two things in question; the expression of the known data, and the disengagement of the unknown.

41. The expression of the data is properly what is meant by the state of the question, and the discovery of the unknown is the reasoning which solves it.

42. In reasoning from facts, the most powerful analogy is that which rests on the relation of the effects to the causes, or of the causes to the effects; nay, it becomes a demonstration when it is confirmed by the concurrence of all the circumstances.

43. It is an evidence of fact, that this earth is subject to diurnal and annual revolutions, and it is an evidence of reason, that these revolutions are produced by the motion of the earth, of the sun, or of both.

44. But we observe that the planets describe orbits round the sun, and we likewise assure ourselves by the evidence of fact, that some of them have a movement of rotation upon their axis, more or less inclined.

45. Now it is an evidence of reason, that this twofold revolution must necessarily produce days and nights, seasons and years; since days and nights, seasons and years, are produced from the twofold revolution of the earth.

46. This analogy supposes that the same effects have the same causes; a supposition, which, being confirmed by new analogies and new observations, can no longer be called in question.

47. It is thus that we have tried to reason in this work.

We have observed nature, and learned analysis from it. For it is only from nature and analysis that we can learn the true logic.

RHETORIC.

Rhetoric, or oratory. This art like all others is the result of observations and experiments made by men of good capacities and of enlightened minds. After multiplied and often defective essays, those principles are at length discovered, which distinguish between the good and the bad, the perfect and the imperfect.

2. These principles, when reduced to method, and well arranged, save succeeding inquirers much pains and trouble; they considerably shorten the road to knowledge; and materially assist in the formation of correct judgment.

3. As in respect to poetry it is contended that, though accurate rules of criticism will not bestow genius, they will check redundancy and bombast, and detect all the errors into which the competitors for the laurels are too apt to be betrayed.

4. So with regard to the precepts of rhetoric; it may safely be asserted, that though they will not generate the energy of the mind which rises to the highest flights of eloquence, they will effectually warn the orator against incongruity in the disposition of his matter, absurdity in argument, and the false glitter of ornament which amuses instead of convincing, or those injudicious attempts to interest the feelings which excite ridicule rather than sympathy.

5. This will be more manifest, if we consider that the foundation of eloquence is right reason, and that its exercise implies the possession of that faculty both in the speaker and the hearer.

6. In displaying the utility of the art of rhetoric,

Quintillian expresses himself in the following forcible terms. "If in any thing the Creator has distinguished us from the rest of animals, it is by the gift of speech. They surpass us in strength, in patience, in size, in swiftness, and especially in the independence of foreign aid.

7. Guided by instinct they soon learn by its instructions to walk, to feed themselves, and to swim; their protection against the cold, and their weapons of defence are provided for them by nature. But what pains and labour does it cost man to procure all these things.

8. Reason is our inheritance, and seems to associate us to immortal beings. But how feeble would reason be, if it were not for the faculty of expressing our thoughts by speech, which is the faithful interpreter of reason.

9. This is what is wanting to the inferior animals much more than understanding, of which it cannot be justly said that they are absolutely destitute.

10. If then we have received nothing from the Deity better than the use of speech, what is there which we ought to cultivate with greater industry? What object is more worthy our ambition, than that of rising above other men by that faculty, which alone raises them above the level of the brutes?"

11. A still greater dignity will attach to the acquirement of eloquence; and consequently, to the science of rhetoric: if it be considered that eloquence and freedom go hand in hand.

12. It is in free states and under popular governments, that oratory can flourish. When the people are appealed to on the subject of state affairs; when political measures are to be enforced by the enlightening of their judgment, or by the excitement of their passions, the greatest talents are exercised in studying the art of persuasion.

13. But when brute force predominates and the people bow beneath the yoke of tyranny, the voice of reason is stilled, and eloquence is mute.

14. The ancient rhetoricians distinguished oratorical

composition into three species, namely; the demonstrative; the deliberative; and the judicial.

15. *Demonstrative eloquence* consists chiefly in bestowing praise or blame, and comprehends in its definition the panegyrics and funeral eulogies so much in use among the ancients.

16. *Deliberative eloquence* comprehends a most extensive field, embracing as its object the whole extent of public affairs; such for instance as war and peace, political negociations, domestic interests, foreign alliances, the regulation of trade and commerce, and in general, all matters connected with legislation and government.

17. This species of eloquence cannot be cultivated in any other than in a free state. The will of an arbitrary monarch supercedes its use, or terrifies it to silence.

18. *Judicial eloquence* comprehends in its purview the whole extent of judicial proceedings, both civil and criminal; that is to say, the attack and defence of persons and property.

19. The most recent and popular work on the present subject is Jamieson's grammar of Rhetoric, from which the following observations are selected.

20. DELIVERY. The great objects which every speaker will naturally have in view in forming his delivery, are, first to speak so as to be fully and easily understood by all who hear him; and next to speak with grace and force, so as to please and to move his audience.

21. In order to be fully and easily understood, the four chief requisites are, a due degree of loudness of voice; distinctness; slowness; and propriety of pronunciation.

22. The first attention of every speaker, doubtless, must be to make himself be heard by all to whom he speaks. He must endeavour to fill with his voice the space occupied by the assembly.

23. In the next place, to be well heard, and clearly understood, distinctness of articulation contributes more, perhaps, than mere loudness of voice.

24. In the third place, in order to articulate distinctly,

tion is requisite with regard to the speed of pro-
ıg. Precipitancy of speech confounds all articu-
ınd all meaning.

After these fundamental attentions to the pitch
ınagement of the voice, to distinct articulation,
a proper degree of slowness of speech, what a
speaker must in the fourth place study, is pro-
f pronunciation, or the giving to every word he
hat sound which the most polite usage of language
iates to it.

Emphasis, pauses and tones. By emphasis is meant
ger and fuller sound of voice by which we dis-
the accented syllable of some word, on which we
o lay particular stress, and to show how it effects
of the sentence.

ometimes the emphatic word must be distinguish-
particular tone of voice, as well as by a stronger
On the right management of emphasis, depends
le life and spirit of every discourse.

Next to emphasis the pauses in speaking demand
n. These are of two kinds; first *emphatical pauses*,
t, such as mark the distinctions of the sense. An
cal pause is made after something has been said
liar moment; and on which we want to fix the
attention.

But the most common and principal use of pauses
ark the division of the sense, and at the same time
the speaker to draw his breath; and the proper
eful adjustment of such pauses is one of the most
l difficult articles in delivery.

When we are reading or reciting verse, there is a
difficulty in making the pauses justly. The diffi-
ises from the melody of the verse, which dictates
ır pauses or rests of its own.

The rule of proper pronunciation here is to regard
pauses which the sense forms; and to read the
cordingly. The neglect of the ceasual pause may
e lines sound somewhat unharmoniously; but the

effect would be much worse, if the sense were sacrificed to the sound.

32. Tones in pronunciation are different both from emphasis and pauses: they consist in the *modulation* of the *voice*, and the *notes* or variation of *sound* which we employ in speaking.

33. *Gesture.* The fundamental rule as to propriety of *action*, is undoubtedly the same with what has been given as to propriety of tone. Attend to the looks and gestures; in which earnestness, indignation, compassion, or any other emotion discovers itself to most advantage, in the common intercourse of men, and let these be your models.

34. Some of these looks and gestures are common to all men; and there are also certain peculiarities of manner which distinguish every individual. A public speaker must take that manner which is most natural to himself.

35. It is not the business of a speaker to form to himself a certain set of motions and gestures, which he thinks the most becoming and agreeable, and to practice these in public, without their having any correspondence to the manner which is natural to him in private.

36. His gestures and motions ought to carry that kind of expression which nature has dictated to him; and unless this be the case, it is impossible by any means of study to avoid their appearing stiff and forced.

POLITICS.

Politics implies the science of legislation and government. Government, in a political sense, may be defined as being a system of rules and laws by which the national concerns of a state are regulated. These rules and laws emanate from those who are acknowledged by the people as holding power and authority over them to a greater or less extent.

2. Civil government was instituted for the preserva-

ion and advancement of men's civil interests, and for the better security of their lives, liberty and property.

3. The great object of all political institutions should be the preservation of the natural and inherent rights of man. These rights are liberty, security, the possession of property and the resistance of oppression. The nation is essentially the source of all sovereignty, and no individual nor body of men, can be entitled to any authority which is not expressly derived from it.

4. Political liberty consisting in the power of doing whatever does not injure another; the exercise of the natural rights of man, has no other limits than those which are necessary to secure to every other man the free exercise of the same rights; and these limits are determinable by law only.

5. The law is an expression of the will of the community; all the people have a right to concur, either personally, or by representatives, in its formation; it should be the same to all, whether it protects or punishes; and all being equal in its right, are equally eligible to all honours, places, and employments according to their different abilities; without any other distinction than that created by their virtues and talents.

6. The unrestrained communication of thoughts and opinions, being one of the most precious rights of man, every person should be allowed full liberty to express his political or religious sentiments, being only responsible for the abuse of this liberty to laws previously enacted.

7. The use and necessity of government is such, that there never was an age or country without some civil authority; but as men are seldom unanimous in the means of attaining their ends, so their difference in opinion, in relation to government, has produced a variety of forms in it.

8. To enumerate them would be to recapitulate the history of the whole earth. But they may in general be reduced to one of these heads; either the civil authority is delegated to one or more, or else it is still reserved to

the whole body of the people: whence arises the kno distinctions of government into monarchy, aristocracy, democracy.

9. *Monarchy.* A monarchy is a government in whi the supreme power is vested in a single person. Th are two kinds of monarchy, absolute and limited. absolute monarchy is when a monarch or sovereign is ve ed with absolute power, and is accountable to none b God, as is the case in China, Turkey, and Barbary.

10. A limited monarchy is that government in whi the supreme authority is virtually in the laws, through t majesty of government, and administration is vested in singl person

11. Monarchies are also either hereditary, where t regal power descends immediately from the possessor the next heir by blood; or elective, where the choice d pends upon all who enjoy the benefit of freedom, or whe a few persons in whom the constitution vests the power election.

12. The dangers of monarchies are, tyranny, exactior expense, military domination, unnecessary wars, waged gratify the passions of an individual, risk of the charact of the reigning prince, ignorance in the governors of t interests and accommodation of the people, and a cons quent deficiency of salutary regulations, want of consi tency and uniformity in the rules of government, a proceeding from thence, insecurity of persons and pr perty.

13. *Aristocracy* is that government in which the s preme power is vested in a number of individuals, in co sequence of their wealth, title, or distinction. There a two kinds of aristocracy; the one is, when the nobility rulers separately and individually have no authority b yond the rest of the community. And the other is, whe the nobles are individually invested with great person power and immunities.

14. Of these two, the former is more tolerable than th latter. For, although many, or even all the members

a senate should be so profligate as to abuse the authority of their stations, in the prosecutions of private designs, yet while all are not under a temptation to the same injustice, and having the same end to gain, it would be difficult to obtain the consent of a majority to any specific act of oppression which the iniquity of an individual might prompt him to propose.

15. But of all species of governments, that is the most odious which gives a numerous nobility absolute power and authority over their vassals and dependants.

16. The freedom and satisfaction of private life are more restrained and harrassed by it than by the most vexatious laws, or even by the lawless will of an arbitrary monarch, from whose knowledge and from whose injustice a great part of his subjects are removed by their distance, or concealed by their obscurity.

17. *Democracy.* A democracy is that kind of government wherein the people at large, either collectively or by representation, constitute the legislature. The advantages of this government are, liberty, or an exemption from needless restrictions, equal laws, regulations adapted to the wants and circumstances of the people, public spirit, frugality in public expenditures, and the diffusion of knowledge.

18. Popular elections procure to the common people courtesy from their superiors. The satisfaction which the people in free governments derive from the knowledge and agitation of political subjects, such as the proceedings and debates in the national legislature, the conduct and character of ministers, and the revolutions, intrigues, and contention of parties, excite just enough interest and emotion in the people to afford a moderate engagement of the mind without any painful degree of anxiety, or leaving a fixed oppression on the spirits.

19. The government of the United States may be denominated a federal democratic republic; and is more consistent with the principles of liberty and justice than any other political system ever organized for the happiness

and welfare of a nation. It may be considered as "giving the sanctions of law to the precepts of reason."

20. We cannot give the reader a better knowledge of the political regulations of our own country than by offering to his examination the Constitution of the United States, in which the features of our national government are fully delineated.

CONSTITUTION OF THE UNITED STATES.

We, the people of the United States, in order to form a more perfect union, establish justice, ensure domestic tranquillity, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this constitution for the United States of America.

ARTICLE I.

SECTION I.

2. All legislative powers herein granted, shall be vested in a congress of the United States, which shall consist of a senate and house of representatives.

SECTION II.

3. The house of representatives shall consist of members chosen every second year, by the people of the several states: and the electors in each state, shall have the qualifications requisite for electors of the most numerous branch of the state legislature.

4. No person shall be a representative, who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States; and who shall

not, when elected, be an inhabitant of that state in which he shall be chosen.

5. Representatives and direct taxes, shall be apportioned amongst the several states, which may be included within this union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and excluding Indians not taxed, three-fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the congress of the United States; and within every subsequent term of ten years, in such manner as they shall by law direct.

6. The number of representatives shall not exceed one for every thirty thousand: but each state shall have at least one representative: and, until such enumeration shall be made, the state of New-Hampshire shall be entitled to choose three, Massachusetts eight; Rhode-Island and Providence plantations one; Connecticut five; New-York six; New-Jersey four; Pennsylvania eight; Delaware one; Maryland six; Virginia ten; North Carolina five; South Carolina five; and Georgia three.

7. When vacancies happen in the representation of any state, the executive authority thereof shall issue writs of election to fill such vacancies.

8. The house of representatives shall choose their speaker and other officers; and shall have the sole power of impeachment.

SECTION III.

9. The senate of the United States shall be composed of two senators from each state, chosen by the legislature thereof; for six years; and each senator shall have one vote.

10. Immediately after they shall be assembled, in consequence of the first election, they shall be divided, as equally as may be, into three classes. The seats of

the senators of the first class shall be vacated at t piration of the second year; of the second class expiration of the fourth year; and of the third cl the expiration of the sixth year; so that one-third r chosen every second year.

11. And if vacancies happen, by resignation or wise, during the recess of the legislature of any sta executive thereof may make temporary appointmen the next meeting of the legislature, which shall t such vacancies.

12. No person shall be a senator, who shall nc attained to the age of thirty years, and been nine citizen of the United States; and who shall not, elected, be an inhabitant of that state for which h be chosen.

13. The vice-president of the United States s president of the senate, but shall have no vote unle be equally divided.

14. The senate shall choose their other officer also a president pro tempore in the absence of th president, or when he shall exercise the office of pr of the United States.

15. The senate shall have the sole power to impeachments. When sitting for that purpose, th be on oath or affirmation. When the president United States is tried, the chief Justice shall presi no person shall be convicted, without the concurr two-thirds of the members present.

16. Judgment, in cases of impeachment, shall tend further than to removal from office, and disqu tion to hold and enjoy any office of honor, trust, o under the United States. But the party convicte nevertheless, be liable and subject to indictmen judgment, and punishment according to law.

SECTION IV.

17. The times, places, and manner of holding e

for senators and representatives, shall be prescribed in each state by the legislature thereof; but the congress may, at any time, by law, make or alter such regulations, except as to the places of choosing senators.

18. The congress shall assemble at least once in every year; and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

SECTION V.

19. Each house shall be the judge of the elections, returns and qualifications of its own members; and a majority of each shall constitute a quorum to do business, but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner, and under such penalties as each house may provide.

20. Each house may determine the rules of its proceedings; punish its members for disorderly behaviour; and with the concurrence of two-thirds, expel a member.

21. Each house shall keep a journal of its own proceedings, and, from time to time, publish the same, excepting such parts as may in their judgment require secrecy: and the yeas and nays, of the members of either house, on any question, shall, at the desire of one-fifth of those present, be entered on the journal.

22. Neither house during the session of congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting.

SECTION VI.

23. The senators and representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the treasury of the United States. They shall, in all cases, except treason, felony, and breach of

the peace, be privileged from arrest, during their attendance at the session of their respective houses, and in going to, and returning from the same: for any speech or debate in either house, they shall not be questioned in any other place.

24. No senator or representative shall, during the time for which he was elected, be appointed to any civil office, under the authority of the United States, which shall have been created, or the emoluments of which shall have been increased, during such time; and no person holding any office under the United States shall be a member of either house, during his continuance in office.

SECTION VII.

25. All bills, for raising revenue, shall originate in the house of representatives: but the senate shall propose or concur with amendments, as on other bills.

26. Every bill, which shall have passed the house of representatives and the senate, shall, before it becomes a law, be presented to the president of the United States. If he approve, he shall sign it: but if not, he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it.

27. If, after such reconsideration, two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered: and, if approved by two-thirds of that house, it shall become a law.

28. But, in all such cases, the votes of both houses shall be determined by yeas and nays; and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively.

29. If any bill shall not be returned by the president, within ten days (Sunday excepted) after it shall have been presented to him, the same shall be a law, in like manner as if he had signed it, unless the congress, by

their adjournment, prevent its return; in which case it shall not be a law.

30. Every order, resolution, or vote, to which the concurrence of the senate and house of representatives may be necessary, (except on a question of adjournment) shall be presented to the president of the United States; and, before the same shall take effect, be approved by him; or, being disapproved by him, shall be repassed by two-thirds of both houses, according to the rules and limitations prescribed in the case of a bill.

SECTION VIII.

31. The congress shall have power—

To lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defence, and general welfare of the United States: but all duties, imposts, and excises, shall be uniform throughout the United States.

32. To borrow money on the credit of the United States.

To regulate commerce with foreign nations, and among the several states, and with the Indian tribes.

33. To establish a uniform rule of naturalization; and uniform laws on the subject of bankruptcies, throughout the United States.

To coin money; to regulate the value thereof, and of foreign coin; and fix the standard of weights and measures.

34. To provide for the punishment of counterfeiting the securities and current coin of the United States.

To establish post offices and post roads.

To promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries.

35. To constitute tribunals inferior to the supreme court.

To define and punish piracies and felonies committed on the high seas, and offences against the law of nations.

To declare war; grant letters of marque and reprisal; and make rules concerning captures on land and water.

36. To raise and support armies. But no appropriation of money for that use, shall be for a longer term than two years.

To provide and maintain a navy.

To make rules for the government and regulation of the land and naval forces.

37. To provide for calling forth the militia to execute the laws of the union, suppress insurrections, and repel invasions.

To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States; reserving to the states respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by congress.

38. To exercise exclusive legislation, in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of congress, become the seat of the government of the United States; and to exercise like authority over all places purchased by the consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dock-yards, and other needful buildings.

39 To make all laws which shall be necessary and proper for carrying into execution the foregoing powers and all other powers vested by this constitution in the government of the United States, or any department or officer thereof.

SECTION IX.

40. The migration or importation of such persons, as any of the states now existing shall think proper to admit,

shall not be prohibited by the congress, prior to the year one thousand eight hundred and eight; but a tax may be imposed on such importation, not exceeding ten dollars for each person.

41. The privilege of the writ of habeas corpus shall not be suspended, unless when, in cases of rebellion or invasion, the public safety may require it.

No bill of attainder or ex post facto law shall be passed.

42. No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration herein before directed to be taken.

No tax or duties shall be laid on articles exported from any state. No preference shall be given by any regulation of commerce or revenue, to the ports of one state, over those of another; nor shall vessels, bound to or from one state, be obliged to enter, clear, or pay duties in another.

43. No money shall be drawn from the treasury, but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

44. No title of nobility shall be granted by the United States; and no person, holding any office of profit or trust under them, shall, without the consent of congress, accept of any present, emolument, office, or title, of any kind whatever, from any king, prince, or foreign state.

SECTION X.

45. No state shall enter into any treaty, alliance, or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make any thing but gold and silver coin a tender in payment of debts; pass any bill of attainder, ex post facto law, or law impairing the obligation of contracts, or grant any title of nobility.

46. No state shall, without the consent of congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its in-

spection laws; and the neat produce of all duties i posts laid by any state on imports or exports, shal the use of the treasury of the United States; and a laws shall be subject to the revision and control o gress.

47. No state shall, without the consent of co lay any duty on tonnage, keep troops, or ships of time of peace, enter into any agreement or compa another state, or with a foreign power, or engage unless actually invaded, or in such imminent dai will not admit of delay.

ARTICLE II.

SECTION. I.

48. The executive power shall be vested in a pr of the United States of America. He shall hold fice during the term of four years, and together w vice-president, chosen for the same term, be ele follows:

49. Each state shall appoint, in such manner legislature thereof may direct, a number of electors to the whole number of senators and representati which the state may be entitled in the congress. senator or representative, or person holding any o trust or profit under the United States, shall be ap an elector.

50. The electors shall meet in their respective and vote by ballot for two persons, one of whom a shall not be an inhabitant of the same state with selves. And they shall make a list of all the person for; and of the number of votes for each; which li shall sign and certify, and transmit, sealed, to the the government of the United States, directed to th dent of the senate.

51. The president of the senate shall, in the p of the senate and house of representatives, open

tificates, and the votes shall then be counted. The per- having the greatest number of votes shall be the pre- ent, if such number be a majority of the whole num- of electors appointed; and if there be more than one o have such majority, and have an equal number of es, then the house of representatives shall immediately ose by ballot one of them for president; and if no per- have a majority, then, from the five highest on the the said house shall, in like manner, choose the pre- ent.

50. But in choosing the president, the votes shall be en by states, the representation from each state having vote: a quorum for this purpose shall consist of a mem- or members from two-thirds of the states; and a ma- ty of all the states shall be necessary to a choice.

51. In every case, after the choice of the president, person having the greatest number of votes of the ctors, shall be the vice-president. But if there should ain two or more who have equal votes, the senate ll choose from them, by ballot, the vice-president.

52. The congress may determine the time of choosing ctors, and the day on which they shall give their votes; ich day shall be the same throughout the United tes.

53. No person, except a natural born citizen, or a citi- of the United States at the time of the adoption of s constitution, shall be eligible to the office of president. ither shall any person be eligible to that office who ll not have attained to the age of thirty-five years, and n fourteen years a resident within the United States.

54. In case of the removal of the president from of- , or of his death, resignation, or inability to discharge powers and duties of the said office, the same shall volve on the vice-president; and the congress may, by , provide for the case of removal, death, or inability h for the president and vice-president, declaring what cer shall then act as president; and such officer shall

act accordingly, until the disability be removed, or a president shall be elected.

55. The president shall, at stated times, receive for his services, a compensation which shall neither be increased nor diminished during the period for which he shall have been elected; and he shall not receive, within that period, any other emolument from the United States, or any of them.

56. Before he enter on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of president of the United States; and will, to the best of my ability, preserve, protect, and defend the constitution of the United States."

SECTION II.

57. The president shall be commander in chief of the army and navy of the United States, and of the militia of the several states, when called into the actual service of the United States. He may require the opinion in writing of the principal officers in each of the executive departments, upon any subject relating to the duties of their respective offices; and he shall have power to grant reprieves and pardons, for offences against the United States, except in cases of impeachment.

58. He shall have power, by and with the advice and consent of the senate, to make treaties, provided two-thirds of the senators present concur; and he shall nominate, and by and with the advice and consent of the senate, shall appoint ambassadors, other public ministers, and consuls, judges of the supreme court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law. But the congress may, by law, vest the appointment of such inferior officers as they think proper in the president alone, in the courts of law, or in the heads of departments.

59. The president shall have power to fill up all vacan-

it may happen during the recess of the senate, by
g commissions which shall expire at the end of
ext session.

SECTION III.

He shall from time to time give to the congress in-
on of the state of the union; and recommend to
onsideration such measures as he shall judge neces-
d expedient. He may, on extraordinary occasions,
e both houses or either of them; and, in case of
ement between them, with respect to the time of
ment, he may adjourn them to such time as he
ink proper. He shall receive ambassadors and
ublic ministers. He shall take care that the laws
fully executed; and shall commission all the officers
United States.

SECTION IV.

The president, vice-president, and all civil officers
United States shall be removed from office on im-
ent for, and conviction of, treason, bribery, or
gh crimes and misdemeanors.

ARTICLE III.

SECTION I.

The judicial power of the United States shall be
n one supreme court, and in such inferior courts
congress may, from time to time ordain and esta-
The judges, both of the supreme and inferior courts,
ld their offices during good behaviour; and shall,
d times, receive for their services a compensation,
shall not be diminished during their continuance
e.

SECTION II.

The judicial power shall extend to all cases in law

and equity, arising under this constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party.

64. To controversies between two or more states, between a state and citizens of another state, between citizens of different states, between citizens of the same state claiming lands under grants of different states, and between a state, or the citizens thereof and foreign states, citizens, or subjects.

65. In all cases, affecting ambassadors, other public ministers and consuls, and those in which a state shall be a party, the supreme court shall have original jurisdiction. In all the other cases before mentioned, the supreme court shall have appellate jurisdiction both as to law and fact, with such exceptions, and under such regulations, as the congress shall make.

66. The trial of all crimes, except in cases of impeachment, shall be by jury, and such trial shall be held in the state where the said crimes shall have been committed; but when not committed within any state, the trial shall be at such place or places as the congress may by law have directed.

SECTION III.

67. Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

68. The congress shall have power to declare the punishment of treason; but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted.

ARTICLE IV.

SECTION I.

69. Full faith and credit shall be given, in each state, to the public acts, records, and judicial proceedings of every other state. And the congress may, by penal laws, prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

SECTION II.

70. The citizens of each state shall be entitled to all the privileges and immunities of citizens in the several states.

A person charged in any state with treason, felony or other crime, who shall flee from justice and be found in any other state, shall, on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the state having jurisdiction of the crime.

71. No person, held to service or labour in one state under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labour; but shall be delivered upon claim of the party to whom such service or labour may be due.

SECTION III.

72. New states may be admitted by the congress into this union; but no new state shall be formed or erected within the jurisdiction of any other state, nor any state be formed by the junction of two or more states—without the consent of the legislatures of the states concerned as well as of the congress.

73. The congress shall have power to dispose of, and make all needful rules and regulations respecting the ter-

ritory or other property belonging to the United States: and nothing in this constitution shall be so construed as to prejudice any claims of the United States, or of any particular state.

SECTION IV.

74. The United States shall guarantee to every state in this union, a republican form of government; and shall protect each of them against invasion, and on application of the legislature, or of the executive (when the legislature cannot be convened) against domestic violence.

ARTICLE V.

75. The congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this constitution, or on the application of the legislatures of two-thirds of the several states, shall call a convention for proposing amendments; which, in either case, shall be valid to all intents and purposes, as part of this constitution, when ratified by the legislatures of three-fourths of the several states, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the congress: provided, that no amendment which may be made prior to the year one thousand eight hundred and eight, shall in any manner affect the first and fourth clauses in the ninth section of the first article; and that no state, without its consent, shall be deprived of its equal suffrage in the senate.

ARTICLE VI.

76. All debts contracted, and engagements entered into before the adoption of this constitution, shall be as valid against the United States, under this constitution, as under the confederation.

77. This constitution, and the laws of the United

States which shall be made in pursuance thereof, and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land, and the judges in every state, shall be bound thereby, any thing in the constitution or laws of any state to the contrary notwithstanding.

78. The senators and representatives before mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound by oath or affirmation, to support this constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

79. Done in the convention by the unanimous consent of the states present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America the twelfth.

AMENDMENTS.

80. The following articles in addition to, and amendment of, the constitution of the United States, having been ratified by the legislatures of nine states, are equally obligatory with the constitution itself.

81. CONGRESS shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof, or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.

82. A well regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

No soldier shall, in time of peace, be quartered in any house, without the consent of the owner; nor in time of war, but in a manner to be prescribed by law.

83. The right of the people to be secure in their persons, houses, papers, and effects against unreasonable

searches and seizures, shall not be violated; and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

84. No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service, in time of war, or public danger: nor shall any person be subject, for the same offence, to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case, to be witness against himself; nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

85. In all criminal prosecutions, the accused shall enjoy the right to a speedy and public trial, by an impartial jury, of the state and district wherein the crime shall have been committed; which district shall have been previously ascertained by law; and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favour; and to have the assistance of counsel for his defence.

86. In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved; and no fact tried by jury shall be otherwise re-examined in any court of the United States, than according to the rules of the common law.

87. Excessive bail shall not be required; nor excessive fines imposed; nor cruel and unusual punishment inflicted.

The enumeration, in the constitution, of certain rights, shall not be construed to deny or disparage others retained by the people.

88. The powers not delegated to the United States by the constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

89. The judicial power of the United States shall not

be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another state, or by citizens or subjects of any foreign state.

90. The electors shall meet in their respective states, and vote by ballot for president, and vice-president, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as president, and in distinct ballots the person voted for as vice-president; and they shall make distinct lists of all persons voted for as president, and of all persons voted for as vice-president, and of the number of votes for each, which list they shall sign and certify, and transmit sealed to the goverment of the United States, directed to the president of the senate.

91. The president of the senate shall, in the presence of the senate and house of representatives, open all the certificates, and the votes shall then be counted: the person having the greatest number of votes for president shall be the president, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers not exceeding three on the list of those voted for as president, the house of representatives shall choose immediately, by ballot, the president.

92. But in choosing the president, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the states, and a majority of all the states shall be necessary to a choice.

93. And if the house of representatives shall not choose a president whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the vice-president shall act as president, as in the case of the death or other constitutional disability of the president.

94. The person having the greatest number of votes as vice-president, shall be vice-president, if such number

be a majority of the whole number of electors appointed; and if no person have a majority, then from the two highest numbers on the list the senate shall choose the vice-president; a quorum for the purpose shall consist of two-thirds of the whole number of senators, and a majority of the whole number shall be necessary to a choice.

95. But no person constitutionally ineligible to the office of president shall be eligible to that of vice-president of the United States.

MYTHOLOGY.

MYTHOLOGY signifies a system of fables, and as such we present the reader with the history of the pretended gods and goddesses of antiquity. As these fabulous deities are introduced into most of the writings of the Greeks and Romans and of several other nations, and as they are made use of at the present day, by the best writers, to give a kind of embellishment to the productions of fancy and fiction, a knowledge of the powers and attributes which they were allowed to possess, must at least, prove satisfactory and pleasing to many.

2. It would, however, be of no real utility to give a minute detail of all the fabulous deities, which the pride, the folly, the vanity, and superstition of men, have created. The following, therefore, embraces only the principal characters enumerated in Tooke's Pantheon; which, for convenience of reference, are arranged in an alphabetical order.

3. Apollo, one of the twelve superior deities,* received the highest adoration, from his being the inventor of physic, music, poetry and rhetoric. He was supposed to pre-

* The twelve superior deities are Jupiter, Neptune and Mercury, Mars, Vulcan and Venus, Minerva, Apollo, Diana and Vesta, Ceres and Juno.

over the muses, and to have taught the art of foreing events, and shooting with the arrow. He raised walls of Troy by the music of his harp alone, if we believe the poet.

> "Troy you shall see, and walls divine admire,
> Raised by the music of Apollo's lyre."

. Aurora, goddess of the morning and of the winds, ie sister of the sun and moon and mother of the stars. eeable to the description of Homer she rides in a cha- of gold, drawn by white horses. Autumnus, the god ruits; Angenona, the goddess of silence; Abeona, the less of voyages, travels, &c. Angenora, the goddess of istry; Atropos, one of the three fates; Amphritrite, the of Neptune; Ambrosia, the food of the gods.

. Bacchus, the god of wine, and the captain and emr of drunkards. He is represented with swollen ks, red face, and a body bloated and puffed up. His ds consist of a drunken band of satyrs and demons. ellona, the goddess of war; Bapta, the goddess of ne; Bolina, a nymph, rendered immortal for her moy and resistance of Apollo; Boreas, ruler of the north l; Brontes, a maker of Jupiter's thunder; Briareus, onstrous giant, son of Titan and Terra; the poets ied him to have an hundred arms and fifty heads.

. Cupid, the son of Mars and Venus, the god of es, love, &c. Calliope, the muse of heroic poetry; uceus, Mercury's golden rod or wand; Cerberus, a with three heads, who guarded the gates of hell; es, the goddess of agriculture, is thus represented by d:

> Ceres was she who first our furrows plough'd;
> Who gave sweet fruits, and easy food allow'd.
> Ceres first tamed us with her gentle laws;
> From her kind hand the world subsistence draws.

. Charon, the ferryman of the rivers of the infernal ons; Clio, the muse presiding over history, and patro-

ness of heroic poetry; Clotho, one of the fates; Collina, the goddess of hills; Comus, the god of festivals and merriment; Concordia, the goddess of peace; Cyclops, Vulcan's workmen, with only one eye in the middle of their forehead.

8. Diana, the goddess of hunting; she is generally represented with a bow in one hand and an arrow in the other, with a quiver full of arrows hanging down her shoulders. Daphne, a nymph, beloved by Apollo; Dryads, nymphs of the woods and forests; Danaides, or Belides, the fifty daughters of Danaus, king of Argos, all of whom, except Hypermnestra, killed their husbands on the marriage night. They were, therefore, condemned to draw water out of a deep well with buckets having many holes in the bottom, so that their labours were without end or success.

9. Elysian fields the paradise of the gods. Endymion, a shepherd of Caria, who, for insolently saluting Juno, was condemned to sleep 30 years; Luna visited him in a cave of mount Patmos. Eratus, the muse of love and poetry; Euterpe, the muse presiding over music; Erebus, an infernal deity, son of Chaos and Nox; Euphrosyna, one of the three graces.

10. Flora, the goddess of flowers; Fortuna, the goddess of happiness, said to be blind; Feronia, a goddess of woods; Fabula, the goddess of lies; Fates, the three daughters of Nox and Erebus, viz. Clotho, Lachesis, and Atropos, entrusted with the lives of mortals; Clotho held the distaff, Lachesis spun the thread of destiny and Atropos with his scissors cut it asunder. Furies, the three daughters of Nox and Acheron, named Alecto, Megæra, and Tisiphone, with hair composed of snakes, and armed with whips, chains, &c.

11. Graces, three attendants on Venus and the muses, viz. Aglaia, Thalia and Euphrosyna. Gorgons, the three daughters of Phorcys and Ceta, Medusa, Euryale and Stheno, who could change into stone whatever they looked upon; Ganymede, the first cup bearer of Jupiter;

Gordius, an husbandman, but afterwards king of Phrygia, remarkable for tying knots of cords, on which the empire of Asia depended, in so very intricate a manner that Alexander the Great, unable to ravel it, cut it to pieces.

12. Hercules, the son of Jupiter and Alcmena, a semi-deity, renowned for his numerous and wonderful exploits and dangerous enterprises. Harpies, three monsters, Aello, Celæno and Ocypete, with faces of virgins, and hands armed with monstrous claws. Hebe, the goddess of youth; Hymen, the god of marriages; Hegesius, a philosopher, who described the miseries of human life with such gloomy eloquence, that many of his auditors killed themselves through despair; Helicon, a famous mountain, dedicated to Apollo and the muses; Hesperus, or Vesper, the evening star. Hydra, a serpent, which had seven, or as some say, nine, others fifty heads, killed by Hercules in Lake Lerna.

13. Ida, a mountain near Troy, frequented by the gods; Idothea, Jupiter's nurse; Icarius, the son of Oebalus, who having received from Bacchus a bottle of wine, went into Attica to show men the use of it; but making some shepherds drunk, they thought he had given them poison, and therefore, threw him into a well. Icarus, the son of Dædalus, who, flying with his father out of Crete into Cicily, and soaring too high, melted the wax of his wings, and fell into the sea, thence called the Icarean sea.

14. Jupiter, the supreme deity and king of gods and men, is represented as seated upon a throne of ivory and gold, under a rich canopy, holding thunder in his right hand, which he brandishes against the giants at his feet, whom he formerly conquered; his sceptre he holds in his left hand, with an eagle resting upon it.

15. Jupiter is usually represented by the ancients as governing the world by his providence, and is described as viewing from an eminence the pursuits and contentions of mankind, and weighing in his scale their fortunes and their merits. He is moderator of the differences of the

gods, and whenever any of the inferior deities asked him a favour, he was disposed to nod his assent.

16. All heaven is represented as shaken with his terrors, and neither men nor gods have the temerity to oppose his will.

> Then spake th' almighty father, as he sate
> Enthroned in gold and clos'd the great debate:
> Th' attentive winds a solemn silence keep,
> The wond'ring waves lie level on the deep;
> Earth to her centre shook; high heav'n was aw'd,
> And all th' mortal pow'rs stood trembling at the god.
>
> VIRG.

17. Juno, the wife of Jupiter, and queen of the gods; Junones, guardian angels of women; Juventa, the goddess of youth; Janus, the god of peace, holds a key in his right hand, and a rod in his left; he has two faces, because he is supposed to see things which are to come, as well as those which are past.

18. Lubantia, the goddess of pleasure; Lethe, a river of hell, whose waters caused a total forgetfulness of things past; Lachesis, one of the three fates; Laocoon, son of Priam, high priest of Apollo; he and his two sons were killed by serpents for opposing the reception of the wooden horse into Troy; Luna, Diana's name in heaven; Lycaon, a king of Arcadia, turned by Jupiter into a wolf.

19. Mercury, the messenger of the gods, and mediator between contending parties, is represented as wearing winged hat and shoes, and holding a rod in his hand, which is also furnished with wings, and bound about with serpents. The character of Mercury, as the swift messenger of the gods, is thus noticed in Homer's Odyssey:

20.—The god who mounts the winged winds,
Fast to his feet the golden pinions binds,
That high through fields of air his flight sustain,
O'er the wide earth and o'er the boundless main;
He grasps the wand and causes sleep to fly,
Or in soft slumbers seals the wakeful eye;
Then shoots from heaven to high Piera's steep.
Or stoops incumbent on the rolling deep.

t. Mars, the god of war, is represented as fierce and ble; he rides, standing in a chariot drawn by horses, :h are driven by a distracted woman; he is covered armour, and brandishes a spear in his right hand, as gh he breathed fire and death, and threatened every r with ruin and destruction.

2. Minerva, the goddess of wisdom; Morpheus, the of sleep, dreams, &c. Muses, nine virgins, born on nt Pierus, who were mistresses of all the sciences. y were said to preside over poets and musicians, and overn the feasts and solemnities of the gods. Their es are Calliope, Clio, Erato, Euterpe, Melpomene, hymnia, Terpsichore, Thalia and Urania. Momus, god of jesting, mockery, and mimicry.

3. Neptune, the god of the sea, and the father of s and fountains, is represented as holding a sceptre in ight hand, like a fork, with three tines, and beauti- arrayed in a mantle of blue; he rides upon the ocean, chariot drawn by sea horses.

Where e'er he guides
His finny coursers, and in triumph rides,
The waves unruffle, and the storm subsides.

4. Nereides, sea nymphs; Niobe, daughter of Tan- , and wife of Amphion, who, preferring herself to ona, had her fourteen children killed by Diana and llo, and wept herself into a statue; Narcissus, a very utiful youth, who fell in love with his own shadow in water and pined away into a daffodil; Nox, the most ent of all the deities; she was even reckoned older Chaos.

5. Oceanus, an ancient sea god; Ocypete, one of the es; Omphale, a queen of Lydia, with whom Hercules so enamoured, that she made him submit to spinning other unbecoming offices; Orion, a great and mighty er; Orpheus, son of Apollo by Calliope, the muse, with the harp his father gave him, played so sweetly

that he tamed wild beasts, turned the course of rivers, and even caused the stones and trees to move by his music.

26. Palladium, a statue of Minerva, which the Trojans imagined fell from heaven, and that their city could not be taken while it remained in it. Pan, the god of forests, shepherds, &c. Pandora, the first woman made by Vulcan, and endowed with gifts by all the deities; Jupiter gave her a box containing all sorts of evils, war, famine, &c. with Hope at the bottom.

27. Parnassus, a mountain, famous for a temple of Apollo, and being the favourite residence of the muses. Pluto the god of hell; Pomona the goddess of fruits and autumn; Prometheus, the son of Iapetus, who animated a man he had made of clay with fire, which, by the assistance of Minerva, he stole from heaven, and was therefore chained by Jupiter to mount Caucasus, with a vulture continually preying upon his liver.

28. Pitho, a goddess of eloquence; Pegasus a winged horse belonging to Apollo and the muses; Philomela, daughter of Pandion, who was ravished by her brother-in-law, and was changed into a nightingale; Pallas and Pylotis, names of Minerva.

29. Rhadamanthus, one of the infernal judges; Rosina a rural deity; Saturn, the son of Terra and Vesta, who shared a part of the kingdom of Janus and reduced the people to civil society, and joined them to each other, as it were in chains of brass, that is, by the brass money which he invented; Salus, the god of health; Salmoneus a king of Elis, struck by a thunder bolt to hell, for imitating Jupiter's thunder; Satyrs, the attendants of Bacchus, horned monsters, half men, half goats.

30. Silenus, the foster father and companion of Bacchus, who lived in Arcadia, rode upon an ass and was drunk every day; Sisyphus, the son of Æolus, killed by Theseus, and doomed incessantly to roll a huge stone up a mountain in hell for his perfidy and numerous robberies; Somnus the god of sleep; Stentor, a Grecian, whose voice is reported to have been as strong and as loud as the voices

of fifty men together; Styx, a river in hell; Syrens, sea monsters that allure mariners to destruction.

31. Tacita, a goddess of silence; Tempe, a most beautiful valley in Thessaly, the resort of the gods; Terpsichore, the muse of music; Thalia, the muse of comedy; Thetis, daughter of Nereus and Doris, and goddess of the sea. Tisiphone Alecto and Megæra were the jailers and executioners of Tartarus or hell, armed with snakes and lighted torches.

32. Vulcan, the god of subterraneous fire, and maker of Jupiter's thunder; Vesta, the goddess of fire; but not the same kind of fire as is produced in Vulcan's forge, nor such as the dangerous flame of Venus, but a pure, unmixed, benign flame, so necessary for us that human life cannot subsist without it. She is represented as the eldest of the goddesses, and as preserving perpetual chastity.

33. Venus, the goddess of the graces, love, and beauty, is represented as clothed with a purple mantle, glittering with diamonds. By her side stand two Cupids, and around her are three graces, and after follows the lovely and beautiful Adonis, who holds her train. The chariot, in which she rides, is made of ivory, finely carved, and beautifully painted and gilded. It is drawn by swans and doves, or swallows, as she directs.

34. She is thus noticed by Virgil,

> Where garlands ever green and ever fair,
> With vows are offer'd, and with solemn pray'r;
> A hundred altars in her temples smoke,
> A thousand bleeding hearts her power invoke.

35. Urania, the muse of astronomy; Zetus, son of Jupiter and Antiope, very expert in music; Zephyrus son of Æolus and Aurora, who passionately loved the goddess Flora, and who governs the west wind.

36. The foregoing relates principally to the mythology of the ancient Greeks and Romans, which was partly derived from Egypt. The more ignorant part of the people

of other nations, have fixed their belief in this kind of traditionary romance.

37. The Chinese, Hindoos, Persians and the Northern nations have had their respective systems of mythology. According to that of China, Fohi was the founder of their empire. He was born in a supernatural manner, and endowed by heaven with knowledge sufficient to teach all arts and sciences, and to form the best of laws.

38. The Chinese believe that their Confucius was born differently from other men, and was able to reason profoundly from his childhood. The mythology of the Hindoos is various, as adopted by different casts or tribes. Brahma however, appears to be their principal Deity. They say he was born in a miraculous manner; and that at the age of thirty, he began to promulgate his doctrine which has since spread over a great part of Asia.

39. The most prominent part of the doctrine of Brahma appears to have been that of the transmigration of the souls of men, into other animals; which has given rise to the worship of idols in the forms of various kinds of the brute creation.

40. The Persians suppose the world to have been repeatedly destroyed; but re-peopled by creatures of different formation, who have been successively annihilated for disobeying the Supreme Being. Their mythology gives an account of the exploits of Tahmuras, one of their ancient kings, who attacked and vanquished the demon that opposed the happiness of the country; and also the labours and adventures of Rostan, another Persian chief, similar in character to the Hercules of Greece and Rome.

41. The Egyptian mythology includes a great variety of romance; the most important of which, relates to the adventures and exploits of Osiris, Oris, Typhon and Iris, and the transformation of their gods into various animals. Objects animate and inanimate were worshipped as emblems of their deities. Jupiter Ammon was worshipped under the figure of a ram; Apis, as a cow; Osiris as a bull; Pan, as a goat; and Thoth, or Mercury, as an ibis.

The last of which was reputed to be the inventor of letters, and all branches of science and philosophy, in which there is no doubt that the Egyptians greatly excelled.

42. According to the legendary tales of the northern nations of Europe, Odin, or Wodin was their principal divinity. He was supposed to have come from the east, and was represented as the god of battles, and as killing thousands at one blow. His palace called Valhalla, was situated in the city of Midgard, where the souls of heroes who bravely fell in battle, enjoyed supreme felicity, and spent the day in hunting matches and combats, and at night assembled in the palace of Valhalla, where they feasted on the most delicious provisions and drank the Scandinavian nectar out of the sculls of their enemies.

43. The numerous tribes and nations, who inhabit the wilds of America, have likewise their fictitious deities, who preside over particular places and govern the destinies of men. Their notions of the good and evil spirits, carry with them about as much whimsical absurdity as those of the more enlightened and civilized nations of antiquity, of whom we have been speaking.

CHRONOLOGY.

CHRONOLOGY is that science which relates to time, treats of the division of it into certain portions, as days, months, years, centuries, and the application of these portions, under various forms and combinations, as, centuries, cycles, æras, &c. all of which assist in the elucidation of history.

2. What is proposed in the present article is, to point out the chief methods by which the several portions of time have been computed, and in which they have been employed in ascertaining the connexion, and determining the dates of past transactions.

3. The divisions of time which most probably first attracted the notice of mankind, as most obvious to their

senses, were those marked by the revolution of the l
venly bodies, days, lunar months, and years: and if tl
had corresponded so exactly to each other, that every l
tion had consisted uniformly of the same number of d
and each year of a regular number of complete lunati
the business of chronology would have been attended
comparatively little difficulty.

4. In consequence, however, of variation in the r
lutions of the earth, which it is not requisite here to
plain, it has become necessary to adjust these period
each other by certain artificial divisions. Of these
sions, *the day* claims our first notice.

5. In common speech, a day means that period of ti
which is included between the first appeance of ligh
the morning and the return of darkness in the even
or during which the sun is visible above the horizon.

6. But the word is used, in a more comprehen
sense, to denote the time of a complete revolution of
earth round its axis. The former has been denomin
a natural, the latter a civil, and sometimes a solar, da

7. The beginning of the day has been variously rec
ed by different nations. The Chaldeans, Syrians,
sians, and Indians, reckoned the day to commence at
rise. The Jews, also, used this method for their c
but began the sacred day at sun-set: this latter mode
used likewise by the Athenians, the Arabs, the anc
Gauls, and some other European nations.

8. The Egyptians appear to have had several met
of reckoning their day; probably the mode varied in
ferent parts of the country, and in the same place at
ferent periods. The ancient inhabitants of Italy con
ted the day from midnight, and in this they have
followed by the English, French, Dutch, Germans, S
iards, and Portuguese: modern astronomers, after the
bians, count the day from noon.

9. The day was subdivided by the Jews and Ro
into four parts, which they denominated watches, or vi
the first commenced at six in the morning, the secon

ıe third at twelve, and the fourth at three in the
n.

The beginning of the first watch was, by the Jews,
he third hour, and so on in succession to the fourth
which was reckoned the twelfth hour. The night
ided in a similar manner.

Other modes of dividing the day have been in use
lifferent nations; but that which is now most gene-
vilized countries is into 24 equal parts, or hours.

The Week, is a division of time, of which it may
er to take some notice before we proceed to the
Various divisions which might be included under
ıomination have obtained in different countries.
lier Greeks divided their month into three portions,
ays each: the northern Chinese had a week of
ays, and the Mexicans one of thirteen.

But the Chaldæns, and most other Oriental nations,
ım time immemorial, used the Jewish week of
ays, which has been adopted by the Mahomme-
ıd introduced, with christianity, to most of the
l nations of the world.

n the Old Testament, the term week is occasion-
lied to a period of seven years, as well as of seven
d to this it is necessary to attend, in order to un-
l the passages wherein the word is used in that

The Month. There can be little doubt, but that
sion of time was at first suggested by the phases,
eriodical change in the appearances of the moon,
nsequently, that in ancient computations the
were invariably lunar. The difficulty, however,
ting this month to the annual revolution of the
d, with the improvement of astronomy, to the in-
of other divisions under this name.

Months are now divided into astronomical and civil.
ronomical months, with which chronology is con-
are measured by the revolutions of the moon, and
r periodical, or synodical. The periodical lunar

month is composed of the time which elapses between the departure of the moon from any part of her orbit and her return to the same point, which is 27 days, 7 hours, and 43 minutes.

17. The synodical lunar month is reckoned from one conjunction of the sun with the moon to another. This period is not always the same, being subject to the variation occasioned by the motion of the sun eastward on the ecliptic: a mean lunation consists of 29 days, 12 hours, and 44 minutes.

18. This was the lunar month mostly in use in ancient times. The civil month is that artificial space of time, by means of which the solar year is divided into twelve parts: these months, which were first ordained by Julius Cæsar, consists of thirty, or thirty-one days each, with the exception of February, which commonly contains twenty-eight, and every fourth year twenty-nine days.

19. *Years.* The year may be termed the largest natural division of time. As the diurnal revolutions of the earth would naturally lead to the division into days, and the phases of the moon, with a little attention, to that into months, so the annual motion of the earth round the sun, which would be marked by the periodical return of certain appearances, seasons, &c. would, in due course, lead to the adoption of this larger division.

20. At what time this took place is uncertain, but probably not before considerable advances had been made in astronomical science. It was long, however, after its first adoption, before it attained to any thing like an accurate form.

21. The most ancient measure of the year, of which we know, consisted of twelve lunar months, which for the facility of computation, being all considered as equal in length, and to contain thirty days each, amounted to 360 days. It is conjectured, that this gave rise to the division of the ecliptic, which still obtains, into 360 equal parts or degrees.

22. This luni-solar year probably had its rise in Chal-

læa, or Egypt; we learn, at least, from the testimony of Herodotus, that it was used in the latter country. Hence, with the diffusion of science, it was carried into other regions, and very generally adopted.

23. It was early in use among the Indians, Chinese, the Medes, and Persians, and the ancient Greeks. Its measure, being, however, inaccurate, containing five days and a quarter more than the lunar, and as much less than the true solar year, and this defect becoming every year more perceptible from the retrocession of the seasons, &c. it was soon considered necessary to subject it to some revision.

24. The Thebans are supposed to have been the first who undertook its correction, by making an annual addition of five days to the luni-solar year. Thales introduced this improvement into the ancient Grecian year, and it was adopted, with some trifling variations in particular instances, into the Indian, the Chinese, and the Jewish year.

25. The Roman year, as regulated by Romulus, and afterwards reformed by his successor Numa, was reckoned by lunar months, and adjusted to the seasons by a number of intercalary days. It consisted of ten inner months, of which December was the last, and to these, two whole intercalary months were added, but not inserted in the calendar.

26. This year began at first in March; but the Decemviri, who undertook its reformation, changed the order of the months into that in which they now stand, introduced the two intercalary months, January and February, into the calendar, and made January the first month of the year.

27. Owing to the ignorance, or the carelessness, of the Pontifices Maximi, to whose care the regulation of the intercalary days was committed, the year was reduced to such disorder in the time of Julius Cæsar, that the winter months had fallen back to the autumn.

28. To restore them to their proper seasons, Cæsar formed a year of 445 days, which has been styled the

year of confusion. With the assistance of Sosigei a mathematician of Alexandria, he afterwards, in year B. C. 45, instituted a solar year of 365 days 6 hou which is now known under the name of the Julian ye

29. To adjust this year to the annual revolution of earth, which is six hours and some minutes more than 3 days, the length of the ordinary year, a day was appoi ed to be intercalated every fourth year in the month February: this day, from its position in the Roman cal dar, was called bissextile, a name which has also be given to the year in which the intercalation takes plac

30. The Julian year, although it approaches very n the truth, is not, however, perfectly correct. The t time of the annual revolution of the sun in the ecliptic 365 days, 5 hours, and nearly 49 minutes, which f short by a few minutes of the time assumed in the Jul year.

31. How trifling soever this difference might at fi appear, it amounted in a hundred and thirty-one ye to a whole day: in consequence of this, the vernal equin which Sosigenes, in the first year of the Julian correcti observed to fall on the 25th of March, had gone back A. D. 325, at the time of the consul of Nice, to the 21 and in A. D. 1582, to the 11th of March.

32. To remedy this growing defect, Pope Gregory X caused the calendar to undergo another correction. A. D. 1580, he ordered ten days to be cut out of t month of October, so that the fourth was reckoned t 15th day: and to prevent such retrocession in future, addition to the Julian regulation with respect to the b sextile year, he ordained that the years 1600, 20(2400, and every fourth century in succession, should ha an intercalation of a day, but that in the other centuri 1700, 1800, 1900, 2100, &c. the day should be omitte and those years remain common years. This regulati comes so near the truth, that the only correction it w require will be the suppression of a day and a half in fi thousand years.

33. The Gregorian year, or, as it is vulgarly called, the new style, was immediately adopted in Spain, Portugal, and part of Italy. It was introduced into France in October of the same year, the tenth of which month was, by an ordinance of Henry III. reckoned the twentieth day. In Germany it was adopted by the Catholic states in 1583, but the Protestant states adhered to the old calendar until the year 1700.

34. Denmark also adopted it about this period, and Sweden, in 1753. It was not known in England and her colonies before 1752, when, by an act of parliament, the style was changed, and the third of September was reckoned the fourteenth, the difference having by this time increased to eleven days. Russia is the only country in Europe in which the old mode of reckoning is in use.

35. Having thus given a short account of the lunar and solar years which have been mostly in use, and an acquaintance with which is of most consequence in chronology, it will be proper just to notice some combinations of years which are mentioned in ancient history, and therefore proper to be known.

36. *Lustra.* The Romans sometimes reckoned by lustra, a period of five years, which derived its name from a census instituted by Servius Tullius, which was to be paid by the Roman people every fifth year.

37. *The Olympiads* were, however, the most remarkable of these combinations. They consisted of four Grecian years, and derived their names from the public games celebrated every fourth year at Olympia, in Peloponnesus.

38. These games were instituted in honor of Jupiter, but at what time, or by whom, is not known. After they had been neglected and discontinued for some time, they were restored by Iphitus, King of Elis, in the year B. C. 776; and it is from this date that the Olympiads are reckoned in Chronology.

39. *Cycles* are fixed intervals of time, composed of the successive revolutions of a certain number of years. The

lustra and the Olympiads may perhaps be included under this name, but the term is more commonly appropriated to larger intervals, connected with the periodical return of certain circumstances and appearances. The great use made of cycles in chronology requires that they be particularly noticed.

40. *The Lunar Cycle*, a period of nineteen solar years, at the end of which interval the sun and moon return to very nearly the same part of the heavens. This improvement was at the time received with universal approbation; but not being perfectly accurate, was afterwards corrected by Eudoxus, and subsequently by Calippus, whose improvements modern astronomers have adopted.

41. The use of this cycle was discontinued when the games, for the regulation of which it was composed, ceased to be celebrated. The Council of Nice, however, wishing to establish some method for adjusting the new and full moons to the course of the sun, with the view of determining the time of Easter, adopted it as the best adapted to answer the purpose: and from its great utility, they caused the numbers of it to be written on the calendar in golden letters, which has obtained for it the name of the golden number.

42. The golden number for any year is found as follows:—The first year of the Christian era corresponds to the second of this cycle; if then to a given year of this era one be added, and the sum be divided by 19, the quotient will denote the number of cycles which have revolved since the commencement of the Christian era, and the remainder will be the golden number for the given year.

43. *The Solar Cycle* is another of these periods, the inventor of which is at present, however unknown. It consists of 28 years, at the expiration of which the sun returns to the sign and degree of the ecliptic which he had occupied at the conclusion of the preceding period, and the days of the week correspond to the same days of the month as at that time. It is used to determine the

Sunday, or dominical letter, which we shall briefly explain.

44. In our present calendars the days of the week are distinguished by the first seven letters of the alphabet: A, B, C, D, E, F, G; and the rule for applying these letters is, invariably, to put A for the first day of the year, whatever it be, B for the second, and so on in succession to the seventh.

45. Should the first of January, be Sunday, the dominical, or Sunday letter for that year will be A, the Monday letter B, &c. and as the number of the letters is the same as that of the days of the week, A will fall on every Sunday, B on every Monday, &c. throughout the year.

46. Had the year consisted of 364 days, making an exact number of weeks, it is obvious that A would always have stood for the dominical letter: the year containing, however, one day more, it follows that the dominical letter of the succeeding year will be G. For Sunday being the first day of the preceding year will be also the last, and the first Sunday in the next year will fall on the seventh day, and will be marked by the seventh letter, or G.

47. This retrocession of the letters will, from the same cause, continue every year, so as to make F the dominical letter of the third, &c. If every year were common, the process would continue regularly, and a cycle of seven years would suffice to restore the same letters to the same days as before. But the intercalation of a day, every bissextile or fourth year, has occasioned a variation in this respect.

48. The bissextile year, containing 366, instead of 365 days, will throw the dominical letter of the following year back two letters; so that, as in the year 1808, if the dominical letter at the beginning of the year be C, the dominical letter of the next year will be, not B, but A.

49. It remains that we give some account of

Epochs and Æras, terms which constantly recur in

history, and the elucidation of which belongs to
vince of chronology. An epoch is a certain point,
determined by some remarkable event, from wl
is reckoned; and the years computed from th
constitute the era. The birth of Christ is c
as an epoch—the years reckoned from that ev
the Christian era.

50. In sacred chronology, the first and most
able epoch is that of the creation of the world.
ed men could not agree as to the precise time
took place, the folly of reckoning from it as a
soon became apparent, and the practice was
quence abandoned. Archbishop Usher, whose
chronology is adopted in our English Bibles,
event in the year 4004 before Christ. Playfair
in 4007.

51. The universal deluge forms another epoc
placed by Usher in the year, B. C. 2349. A th
epoch is the call of Abraham, which happened,
to the same learned authority, B. C. 1921.
epoch is the departure of the Israelites from Ey
Usher places, B. C. 1491.

52. In profane history, we shall first notice
of the Argonautic expedition, an event much c
in ancient history, and of some importance i
logical discussion, from being adopted by Sir Is
ton as the foundation of his system of chronolo
date of this transaction has been placed in the y
B. C. but in this chronologers are not agreed.

53. The destruction of Troy forms another re
epoch. Considerable uncertainty prevails as to
time when this event, as well as the preceding, t
Playfair fixes it in the year, B. C. 1184.

54. The era of the Olympiads we have notic
and it will be unnecessary to give any farther a
it here. The epoch of the building of Rome i
that claims our attention. From the total wan
records, and other necessary documents for dec

question, the date of this event is involved in the obscurity common to many other remote occurrences. The Roman writers themselves, and all who have followed them on the subject, differ widely respecting it.

55. Polybius fixes it in the year B. C. 751. Cato, and others, one year earlier. Terentius Varro places it in 753, B. C. Fabius Pictor, who is followed by Diodorus Siculus, assigns it to 747, B. C. Sir Isaac Newton adopts the year 627, B. C. and Playfair, after Varro, whose computation was used by the Roman Emperors in their public instruments, places it in the year B. C. 753.

56. Great use is made of this epoch in the histories of ancient Rome, and the historical student will do well to ascertain, if possible, what opinion the author he may be perusing adopts, and to what year of the Christian era the first year of Rome, according to his author, corresponds.

57. The dates of the events will, by this method, be accurately ascertained as he proceeds. The Romans sometimes reckoned the year from the establishment of the consular dignity, and afterwards from the years of the Emperors.

58. The era of Nabonassar is another of those standards, by which the dates of events in some histories are regulated. Nabonassar was the founder of the Babylonish monarchy. This era is reckoned from the commencement of his reign, which is placed in the year B. C. 747, of the Julian period 3967, and extends as far down as the death of Alexander. The Nabonassarean year consists of 12 months of 30 days each, and five intercalary days, making in all 365 days.

59. The era of the Seleucidæ, or, as it is sometimes called, the year of the contracts, is reckoned from the establishment of Seleucus, one of Alexander's generals, after that conqueror's death, in the empire of Babylon, and is reckoned from the year B. C. 312. It is generally supposed to have begun in the spring. It was used in a large district of Asia, and adopted by the Jews.

60. The Spanish era, founded on a division of the R man provinces among the Triumviri, was long in use Spain and Africa, and was adopted in the dates of tl principal councils and synods held in those countries. is reckoned from the first of January B. C. 38. This w afterwards superceded by the Christian era.

61. *The Christian era.* Learned men have differed i opinion with respect to the exact time of the birth Christ, some placing it four, other seven years earlier th the first year of the Christian era. The uncertainty whi exists upon this point, arises from the era not having be used until so many centuries had elapsed, that it was in possible to fix the date with accuracy.

62. This is, however, of very little consequence in tl application of this era to chronological purposes, for a are agreed as to the numerical date of every year, tl year 1823 for instance, being universally received as tl year 1823 of the Christian era, although probably not tl exact measure of the time which has elasped from tl birth of Christ.

63. *The Hegira*, which may be called the Moha medan era, is founded upon the flight of Mohammed fro Mecca to Medina, to escape the persecution of his enemie and is computed by his followers from A. D. 622. Th beginning of their year is, however, made to correspo with the 16th day of July.

64. In comparing any year of this era, therefore, wi the corresponding year of the Christian era, it will be n cessary to bear this in mind before it can be done with acc racy. The same may also be observed with regard some of the other eras, the beginnings of the years which do not exactly correspond with that of the Juli year.

65. The Persian era, is the last we shall notice. A cording to the opinion of the most reputable modern chr nologers, this era commenced in June, A. D. 623, co responding with the beginning of the eleventh year of th Hegira. The years of this era, like the Nabonassarea

consists of 12 months of 30 days, with an addition of 5 intercalary days at the end, making in all 365 days.

MEMORABLE EVENTS.

The following chronological summary of events, selected from the most respectable authorities, embraces the principal objects, or outlines of general history, and may serve as a guide to those whose inquiries are directed to the occurrences of former times.

2. We may reasonably suppose, that many of the events of antiquity, particularly those of the Antideluvian ages, are forever lost in the ocean of oblivion. After the creation of the world, and of Adam and Eve, which historians and chronologers have generally established at 4004 years before the birth of Christ, the most remarkable event is, what is denominated the universal deluge, which continued 377 days. B. C. . . . 2348

3. The building of the tower of Babel, and the commencement of the Chinese empire, 2247; the city of Babylon founded by Nimrod, 2240; and the Babylonish monarchy by Belus, ... 2217

4. The walls of the city of Babylon, which were 60 miles in circumference, 350 feet high, and 87 feet thick, were completed, 2144. The kingdom of Egypt, which lasted 1633 years, began, . . . 2188

5. The kingdom of Assyria, commenced by Ninus, 2050; this kingdom lasted upwards of 1000 years, and upon its ruins were formed the Assyrians of Babylon, of Ninevah, and the kingdom of the Medes. Carthage founded by the Tyrians, 1259, built by queen Dido, 1233, destroyed, 146, rebuilt, 123.

6. Jerusalem was founded in a period of antiquity unknown to historians; it was in great splendor about 1800. It was taken by Nebuchadnezzar, 1587;—taken and destroyed by the Romans under Titus, A. D. 70, after a

siege of 18 months. Rebuilt by Adrian, A. D. 130; again destroyed in 136; taken by the Saracens, 622, taken from the Christians by Saladian, 1190; taken by the Crusaders, July 14, 1199, when 70,000 infidels are said to have been massacred.

7. Cecrops brings a colony of Egyptians into Europe, and begins the kingdom of Athens, 1556. Scamander founds the kingdom of Troy, 1546. Moses performs a number of miracles in Egypt and departs from that kingdom with 600,000 Israelites, which completes the 430 years of sojourning, ... 1491

8. The pentateuch, or first five books of Moses, are written in the land of Moab, 1452. Tyre the capital of Phœnica built, 1252. Carthage founded by the Tyrians, 1233. The Trojan war begins, 1193. Homer's Poems brought from Asia into Greece, 866. Rome in Italy is founded by Romulus its first king, . . . 753

9. Rome was destroyed by the Gauls 365 years from its commencement. The Roman empire in its greatest splendour about 780 years from the time of Romulus. The city was supposed to contain upwards of four millions of inhabitants. and to have been fifty miles in circumference. The Goths, Huns, and Vandals, and other barbarous nations commenced their invasions of the Roman empire about 1000 years from the commencement of the Roman era.

10. Byzantium, now Constantinople, built by a colony of Athenians, 650. Cyrus first king of Persia, 559. The kingdom of Babylon terminates; the city having been taken by Cyrus after a siege of two years, . 538

11. First tragedy was acted at Athens on a wagon by Thespes, 534. Tarquin the seventh and last king of Rome is expelled, 509. Wheat brought from Asia Minor and first cultivated in Europe, 500. From the expulsion of Tarquin, Rome was governed by two consuls and other republican magistrates till the battle of Pharsalia, being a space of 461 years. Sardis taken and burnt by the

Athenians which occasions the Persian invasion of Greece. 504

12. Xerxes the great, begins his expedition against Greece, 481. The history of the old testament finishes about 430. Socrates, the founder of moral philosophy amongst the Greeks, believes in the immortality of the soul, and a state of rewards and punishments, for which and other sublime doctrines, he is put to death by the Athenians, who afterwards repent and erect to his memory a statue of brass, ... 400

13. Alexander the great, conquers Darius, king of Persia, and other nations of Asia, 331; dies at Babylon, and his empire is divided by his generals into four kingdoms, 323. The first Punic war between Rome and Carthage which lasted 23 years, begins, . . 264

14. The second Punic war begins and continues 17 years, in which Hannibal, the Carthagenian general, passes the Alps and defeats the Romans in several battles; but being amused by his women, does not improve his victories by the storming of Rome, . . . 218

15. Perseus defeated by the Romans, which ends the Macedonian kingdom, 168. The government of Judea under the Maccabees begins, 163. Carthage the rival of Rome, is totally destroyed by the Romans, . 146

16. Cæsar, the greatest of the Roman conquerors, after having fought fifty pitched battles, and slain upwards of a million of men, and overturned the liberties of his country, is assassinated in the senate house, . 44

17. Battle of Actium fought, in which Mark Antony and Cleopatra are totally defeated by Octavius, nephew of Julius Cæsar, 35. Alexandria in Egypt, is taken by Octavius, upon which Antony and Cleopatra put themselves to death, and Egypt is reduced to a Roman province, 30. The temple of Janus in Rome is shut by command of Augustus, as an emblem of universal peace. *Jesus Christ* is born.

COMMENCEMENT OF THE CHRISTIAN ERA.

1. *First Century.* The Roman legions under Varus cut to pieces in Germany, A. D. 9.—Ovid the poet banished to Pontius the same year. The Emperor banishes the Jews from Rome, 14. John the baptist preaches in Judea the coming of the Messiah, 26. Jesus Christ is baptized in the wilderness by John, 27. Jesus Christ is crucified;—rises again on the third day, 33. Convertion of St. Paul, 35. Pontius Pilate kills himself, 39

2. Claudius Cæsar's expedition into Britain, 43. Caractacus is carried in chains to Rome, 51. Boadocia, the British Queen, defeats the Romans; but is conquered soon after by Suetonius, governor of Britain, 61. Christianity is supposed to have been introduced into Britain by St. Paul, or some of his disciples about, . . 63

3. Rome set on fire, and burned for six days; upon which begins under Nero the first persecution of the Christians, 64. Julius Agricola, governor of South Britain, to protect the civilized Britons from the incursions of the Caledonians, builds a line of forts between the rivers Forth and Clyde; defeats the Caledonians on the grampian hills; and first sails round Britain, which he discovers to be an Island, ... 85

4. Josephus, the historian, governor of Gallilee, 67. Herculaneum and Pompeii destroyed by an eruption of Mount Vesuvius, 79. Dreadful persecution of the Christians at Rome, ... 95

5. *Second Century.* Trajans victory in Asia, 107. The Caledonians re-conquer from the Romans all the southern part of Scotland, upon which the Emperor Adrian builds a wall between Newcastle and Carlisle, 121. Adrian rebuilds Jerusalem, 137. Marius Aurelius Antonius and Lucius Varus Emperors of Rome, . 161

6. The Saracens defeat the Romans, 189—this people for the first time mentioned in history. Partinax Emperor of Rome, 193.—Didius purchases the Empire. Al-

binus proclaimed Emperor of Britain, 196. Albinus is defeated by Severus, ... 197

7. *Third Century.* The Caledonians are repulsed, and a wall is built by Severus between the rivers Forth and Clyde, 209. Christian Churches first built, 214. The Persians totally defeated by Alexander Severus, 226. Maximinus assassinates Alexander Severus and is proclaimed Emperor, ... 235

8. The Franks first noticed in history, 341. The Goths, Burgundians &c. make an eruption into Moecia and Panonica, 253. The Persians take Antioch, Tarsus and Cesarea, 261. Dioclesian Emperor of Rome, 284.—The Dioclesian era commences. Alexandria in Egypt taken by Dioclesian, ... 295

9. *Fourth Century.* The tenth and last persecution against the Christians, ends by an edict of Constantine, who gives full liberty to their religion, 313. The first general council at Nice when 318 fathers attended against Arius; where was composed the famous Necian creed attributed to them, ... 325

Constantine orders the Heathen temples to be destroyed, 331

10. Death of Constantine, 337. The Roman empire divided. Constantinople made the seat of government for the eastern part, 364. The Huns overrun the Missopotamia, and are defeated by the Goths, 383. The Huns invade the eastern provinces of the Roman empire, 395

11. *Fifth Century* Rome sacked and burnt by the Goths, headed by Alric, 410. The Vandals begin their kingdom in Spain, 412. The kingdom of France begins upon the lower Rhine, under Paramond, 420. The Romans withdraw their legions from Britain, . 426

12. Atalia, surnamed the scourge of God, with his Huns, ravages the Roman empire, 447. The city of Venice founded, 455. An earthquake which overturned a part of mount Tagetus, and destroyed the city of Lacedæmon, with about 2000 inhabitants, ... 469

13. Great eruption of Mount Vesuvius which was seen

from Constantinople, 472. Several new states are formed upon the ruins of the Roman empire by the Goths, Vandals and other barbarians; by whom science and literature are destroyed, ... 476

14. *Sixth Century.* Constantinople is besieged by Vitalenius, whose fleet is burned by a specalum of brass, 513. Computation of time by the Christian era is introduced dy Dyonysius the monk, 516. The Persians defeated by Belisarius, 529. Belisarius subdues the Astrogoths in Italy, and takes Rome, ... 543

15. The manufacture of silk introduced into Europe, 551. Italy conquered by the Lombards, 568. Mahomet the false prophet is born in Mecca in Arabia, 571. Latin ceases to be spoken in Italy about 581. Augustus the monk converts the Saxons to Christianity, . 597

16. *Seventh Century.* The temple of the Pantheon at Rome dedicated to God, the virgin and all the saints, 607. The Jews of Antioch massacre the Christians, 608. Jerusalem taken by the Persians, . . 616

17. Mahomet flies from Mecca to Medina in the 44th year of his age, and the tenth of his ministry, where he lays the foundation of the Saracen empire. His followers compute their time from this era, which in Arabia is called the Hegira, meaning the flight, . 622

18. Death of Mahomet, who is succeeded by Abubekir, 632. Jerusalem taken by the Saracens who keep possession of it 463 years, 636. Alexandria in Egypt taken by the Saracens, and the grand library consisting of 400,000 valuable books is burnt by order of Omar their caliph or prince, 640. Glass invented in England by Benalt, a monk, 664. The Britons totally subdued by the Saxons, retreat into Wales and Cornwall, . 685

19. *Eighth Century.* Spain conquered by the Saracens under Mucca, their general, 713. The emperor Leo orders the images in the Christian churches to be thrown down, 726. Civil war against Leo on that account, 727

20. Charlemagne born, 742. Sole monarch of France, 772. He defeats Desiderius, and puts an end to the king-

dom of the Lombards, 774. Subdues the Saxons in 785, and defeats and extirpates the Huns, . . 794

21. *Ninth Century.* Charlemagne begins the empire of Germany, which is afterwards called the western empire, 800. Herold the king of Denmark dethroned by his subjects, for being a Christian, 826. The kingdom of the Saxon Heptarchy, united under Egbert, by the name of England, ... 827

22. Germany separates from the Franks, 842. The Danes begin to ravage England, 872. Alfred the great, begins his reign the same year. The University of Oxford founded by Alfred, 886. The Normans besiege Paris, 887. Alfred the great composes his code of laws, divides England into counties, and establishes County Courts, ... 890

23. *Tenth Century.* Alfred is succeeded by his son Edward, in the kingdom of England, 901. University of Cambridge founded, 915. Pope Boniface is deposed and banished for his crimes, 975. The third race of French kings commences with Hugh Capet, . . 987

24. The figures of Arithmetic are brought into Europe, from Arabia, by the Saracens, 991. Otho the third, makes the empire of Germany elective the same year. Balaslaus, the first king of Poland, . . 999

25. *Eleventh Century.* Paper made of cotton rags, 1000. Great massacre of the Danes in England, by king Ethelrod, 1002. The Turks, a nation of adventurers from Tartary, become formidable and take possession of Persia, ... 1043

26. Macbeth usurps the throne of Scotland, 1040. The Saxon line of the English monarchs, restored under Edward the Confessor, 1041. The Turks take Jerusalem from the Saracens, 1065. The conquest of England by the duke of Normandy, . . . 1066

27. The feudal law introduced into England, 1070. Justices of the peace first established in England the same year. The Tower of London built, 1080. The first

crusade to the Holy Land, is began under several Christian Princes, to drive the Infidels from Jerusalem, . 1095

28. *Twelfth Century.* The orders of Knight Templers, instituted to defend the sepulchre, and to protect the Christian strangers, 1118. Alphonso, first king of Portugal, rescues that sovereignty from the Saracens, 1139. London Bridge, consisting of 19 small arches, first built of stone, 1163. Henry the second, king of England, takes possession of Ireland, 1172. The city of Catena with 15000 inhabitants, swallowed up by an earthquake, 1173. Glass windows begin to be used in private houses in England, ... 1176

29. Pope Alexander the third, compels the kings of England and France, to hold the stirrups of his saddle, while he mounted his horse, 1182. The third crusade commences under Richard the first, and Philip Augustus, 1189. The battle of Ascalon in Judea, in which Richard, king of England, defeats Saladin's army, consisting of 300,000 combatants, ... 1192

30. *Thirteenth Century.* Surnames begin to be used among the nobility, 1202. Constantinople taken by the Turks and Venetians the same year. The Tartars, a new race of heroes emerge form the north part of Asia and overrun the Saracen empire, ... 1227

31. Most of the houses of London and other cities of England, France and Germany still thatched with straw, 1233. The inquisition established by the Dominican monks, 1234. Bagdat taken by the Tartars, which puts an end to the Saracen empire, ... 1258

32. The Norwegians invade Scotland, but are defeated, 1263. The empire of Austria begins, 1273. The conquest of Wales by Edward I, 1283. The present Turkish empire begins under Ottoman, 1298. William Wallace regent of Scotland same year, . 1298

33. *Fourteenth Century.* The Mariner's Compass invented by Gioia, of Naples, 1302. The beginning of the Swiss Cantons, 1307. Gunpowder and guns, invented by Swartz, a monk of Cologne, 1340. Gold first

coined in England, 1344. Cannon bombs and mortars invented, ... 1346

34. John Wickliff, an Englishman, with great acuteness and spirit, begins to oppose the errors of the Church of Rome; his followers are called Lollards, 1362. Bills of Exchange first used in England, 1381. Battle of Oterburn, between Piercy (Hotspur) and Douglas, 1388

35. *Fifteenth Century.* Laurentius of Haarlaem, invented the art of printing, which he practised on separate wooden types, 1430; Gottemberg afterwards invented metallic types, but the art was carried to perfection by Schæffer, who invented the mode of casting the type in matrices. Printing introduced into England, 1468

36. The sea breaks in at Dort in Holland, and drowns 100,000 people, 1446. Engraving and etching on copper invented, 1460. Richard III. king of England, is defeated and killed at the battle of Bosworth, by Henry VII. which puts an end to the civil wars between the houses of York and Lancaster, after a contest of 30 years, and the loss of 100,000 men, ... 1483

37. Christopher Columbus, a Genoese in the service of Spain, discovers America, 1492. South America explored by Americus Vespucius, a Florentine, from whom it derives its name, 1497. Mexico conquered and taken possession of by Spain, 1500. North America was first explored by Sebastian Cabot, a Venetian in the service of England, ... 1494

38. *Sixteenth Century.* Martin Luther begins the reformation, 1517; the first English edition of the bible authorized, 1539. Cannons begin to be used on board of ships, same year. The great massacre of the protestants at Paris, 1572. The Dutch shake off the Spanish yoke, and the republic of Holland begins, . . . 1579

39. The world circumnavigated by sir Francis Drake, 1580. The new style introduced into Italy by Pope Gregory, 1582. Virginia first explored by sir Walter Raleigh, 1582. The great Spanish Armada destroyed by Drake, and other English admirals, 1588. Henry III. king of

France, murdered by Jaques Clement, 1589. The protestant religion tolerated in France, . . . 1598

40. *Seventeenth Century.* First permanent settlement in Virginia, 1606. Galileo first discovers the satellites of Jupiter, 1608. First settlement in New England, at Plymouth, in 1620. New York first explored by Capt. Henry Hudson, 1608; first settled by the Dutch, 1614

41. Delaware first settled by Fins and Swedes, 1627. First colony established in Maryland, 1640. The massacre in Ireland, when 40,000 protestants were killed, 1640. The plague rages in London, and carries off 68,000 persons, 1662. The great fire in London begins Sept. 2nd, and continues 3 days and destroys 13,000 houses, and 401 streets. William Penn, a quaker, receives a charter for planting Pennsylvania, ... 1680

42. *Eighteenth Century.* Gibralter taken from the Spaniards by the British, commanded by Admiral Rook, 1704. The first newspaper in America established at Boston, entitled the News-letter, same year. Russia, formerly a dukedom, established as an empire, . 1728

43. George Washington, born in West-moreland county, Virginia, Feb. 22d, 1732. General Ogelthorpe establishes a colony in Georgia. England declares war against France, 1744. Lisbon destroyed by an earthquake, ... 1755

44. General Braddock is defeated in 1755 by the French and Indians. 146 Englishmen are confined in the black hole at Calcutta, in the East Indies, by order of the Nabob, and 123 found dead the next morning, 1756. Battle on the plains of Abraham, near Quebec, between the English, commanded by Gen. Wolfe, who is killed in the engagement, and French, in which the former are victorious, ... 1759

45. The definitive Treaty of peace between Great Britain, France, Spain, and Portugal, concluded at Paris, Feb. 10, which confirms to Great Britain the extensive provinces of Canada, East and West Florida, and part of Louisiana in North America; also the islands of Gre-

nada, St. Vincent, Dominico, and Tobago in the West Indies, ... 1768

46. A flash of lightning penetrated the theatre at Venice, during the representation; 600 people were in the house, several of whom were killed; it put out the candles, melted a lady's gold watch case, and the jewels in the ears of others, and split several diamonds, August, 1769

47. A spot, or macula, more than three times the size of our earth, passes the sun's centre, April 21, 1766. Dr. Solander and Mr. Banks, in his majesty's ship Endeavour, commanded by Lieut. Cook, returns from a voyage round the world, having made several important discoveries in the South Sea, . . . 1771

48. Captain Phipps is sent to explore the North Pole, but having made eighty-one degrees, is in danger of being locked up in the ice, and his attempts to discover a passage in that quarter prove fruitless, . . 1773

49. The British parliament having passed an act, laying a duty of three pence per pound on all teas imported into America, the colonies considering this a grievance, deny the right of the British parliament to tax them. And deputies from the several colonies meet at Philadelphia, as the first general congress, from which petitions are sent to the king for redress of grievances, 1773. The port of Boston blockaded by the British, . . 1774

50. The first battle of the American revolution was at Lexington, near Boston, in which the British were defeated, April 19. About this time a few log cabins were erected on the ground where Lexington in Kentucky now stands. Articles of confederacy and perpetual union between the American provinces entered into, May 20. George Washington appointed commander in chief of the American armies, June 15. The battle of Bunker's hill, June 17, 1775

51. The town of Boston evacuated by the king's troops, March 17. Congress declare the American colonies *free and independent states*, July 4, 1776. The Americans are driven from Long Island in August following with

great loss, and the city of New York taken possession of by the British troops, ... 1776

52. General Howe takes possession of Philadelphia, 1777; same year, General Burgoyne, with his whole army, consisting of about 10,000 men, is captured by the American forces commanded by Generals Gates and Arnold, Oct. 16, ... 1777

53. A treaty of alliance concluded at Paris, between the French king and the thirteen united American provinces, 1778. Battle of Monmouth, same year. Commissioners arrive at Philadelphia the beginning of June, for the purpose of restoring peace between Great Britain and America. But Congress refuses to treat with them, unless the independence of the American colonies be first acknowledged, or the king's fleets and armies withdraw from America, ... 1778

54. The British garrison at Stony Point, surprised and taken on the night of the 15th July. Grenada taken by the French. An assault upon Savannah in Georgia, by General Lincoln and Count de Estaing, who were repulsed with considerable loss, ... 1779

55. Charleston, in South Carolina, taken by the British. The battle of Camden, in South Carolina. In July, a French fleet, with a body of land forces commanded by Count de Rochambeau, arrives at Rhode Island, 1780

56. Florida taken possession of by the Spaniards. Admiral Rodney takes twenty-two sail of Spanish ships, Jan. 8; and on the 16th of the same month, he engages another Spanish fleet, under the command of Don Juan Languara, near cape St. Vincent, and takes five ships of the line, one being driven on shore, and another blown up, ... 1780

57. Battle of Guilford in North Carolina. Battle of Eutau springs. Count de Grasse arrives with a large French fleet, in the Chesapeake, in August. On the 19th of October following, Lord Cornwallis and his whole army are made prisoners of war at Yorktown, in Virginia, by

the American and French troops, under the command of general Washington and Count Rochambeau, 1781

58. Admiral Rodney obtains a signal victory over the French fleet, under the command of Count de Grasse, near St. Domingo in the West Indies, April 12. The French take and destroy the forts and settlements in Hudson's bay, August 12. The Spaniards defeated in their grand attack on Gibralter, September 13. Provincial articles of peace signed at Paris, between the British and American commissioners, by which the thirteen united American colonies, are acknowledged by his Britannic majesty, to be free sovereign states, 1782

59. Three earthquakes in Calabria and Sicily, destroying a great number of towns and inhabitants, Feb. 5, 7, and 28th. Ratification of the definitive treaty between Great Britain, France, Spain, and the United States of America, Sept. 3, . . . 1783

60. The definitive treaty of peace between Great Britain and Holland, May 24. The memory of Handal commemorated by a grand Jubilee at Westminister abbey, May 26. Mr. Lunardi ascends in a balloon from the artillery ground, Moorfield; the first attempt of the kind in England, Sept. 15, . . . 1784

61. The federal convention assembled at Philadelphia, report a constitution for the United States, Sept. 17, 1787. George Washington chosen the first president of the United States. The first congress under the new constitution meet at New York, March 4. Revolution in France commences; the Bastile destroyed, . 1789

62. Grand confederation in the camp of Mars in Paris. Dr. Franklin dies in Philadelphia, April 7; his death announced in the national assembly of France by M. de Mirabeau. The assembly go into mourning, July 20. Philadelphia made the seat of the general government, ... 1790

63. Vermont admitted into the union, 1791. Insurrection of the negroes in St. Domingo in the West Indies.

A meeting of the citizens of Paris, held in the camp of Mars, to petition the dethronement of the king, 1791

64. The mint established in Philadelphia. Washington city founded. General St. Clair defeated by the Miami Indians, with the loss of 640 men, Nov. 4, . 1791

65. Kentucky, formerly a part of Virginia, made a state and admitted into the union. A multitude in Paris, to the amount of 100,000 persons, armed with pikes, swords, muskets, and artillery, embody and march towards the Thuilleries. The doors are thrown open, and about 40,000 men enter the royal apartment, June 22. Massacre of the Swiss guards, amounting to about 25,000 men, by the populace of Paris, August 10, . 1792

66. Yellow fever similar to the plague, commenced in Philadelphia in June, and continued till November, attended with dreadful mortality. Louis XVI. king of France, is beheaded June 21. British orders in council, authorizing the capture of all American vessels carrying supplies to, or bringing produce from the French colonies, Nov. 6, ... 1793

67. Robespierre and his associates executed in Paris, August 1. Great numbers of people were massacred in France; same year a treaty between Great Britain and the United States, was signed by lord Grenville and John Jay. Insurrection broke out in the western part of Pennsylvania, but was suppressed without bloodshed, 1794

68. A dreadful fire broke out at Copenhagen, which destroyed 1363 houses, several churches, and other public buildings, June 5th. The cape of Good Hope taken by the English under general Clark, and Admiral Elphinston, Sept. 16, ... 1795

69. A large Dutch fleet surrenders to Admiral Elphinston, consisting of three ships of the line, five frigates, sloops, and store ships, near the cape of Good Hope. Tennessee, formerly a part of North Carolina, (first settled in 1789,) admitted into the union, . 1796

70. George Washington resigns the presidency of the United States, and is succeeded by John Adams. Ad-

miral Duncan defeats the Dutch fleet, and captures 9 ships of the line, Oct. 11. A great part of the country between Santa Fee and Panama destroyed by an earthquake, including the cities of Cusco and Quito, with about 40,000 inhabitants, ... 1797

71. Warlike measures authorized against France by the United States, 1798. Battle of the Nile, in which an important victory was achieved by admiral Nelson, who took nine ships of the line from the French, burnt two, &c. same year. The French frigate Insurgente, of 40 guns and 417 men, captured by the Constellation, commanded by commodore Truxton, after an action of one hour and thirty minutes; in which the Insurgente had 29 killed and 44 wounded, and the Constellation had but 1 killed and 2 wounded, Feb. The bashaw of Tripoli orders away the American consul. General Washington aged 68 years, died at Mount Vernon, Virginia, 1799

72. The United States frigate Constellation, commodore Truxton, engaged the French frigate la Vengeance, which after an action of four hours, and having her guns silenced, escaped by the mainmast of the Constellation falling at the moment of victory. Great earthquake at Constantinople, which destroyed the royal palace, and an immense number of other buildings, Oct. 26. Thomas Jefferson chosen president of the United States. Mild winter; vegetation fresh in December. Washington city made the seat of the general government, and the public offices removed there, ... 1800

73. *Nineteenth Century.* Emperor Paul of Russia died suddenly, March 23, and his son Alexander declared his successor to the crown. Battle of Copenhagen. War declared against the United States by the bashaw of Tripoli, June 10, ... 1801

74. Ohio made a state, and admitted into the union. Definitive treaty at Amiens, signed March 25, between France, Spain, and Holland. Bonaparte declared first consul for life, 1802. Louisiana ceded to the United States by France. War commenced between Great Bri-

tain and France. The United States frigate Philadelphia of 44 guns, struck on a rock in the harbor of Tripoli and after resisting the attacks of the forts and gun boats for four hours, was taken by the enemy, . 1803

75. Tripoli bombarded by the United States squadron under command of Commodore Preble. The unexampled tempest begins in the West Indies, and rages for three successive days; the 7, 8, and 9th of September. It inundates the low lands of Carolina and Georgia, attended with immense destruction. Bonaparte crowned emperor of France by the pope, . . 1804

76. General Eaton with 70 Americans and 300 Turks, attack the Tripolitans at Derne, and takes it after a contest of two and a half hours, April, 27. Peace concluded with Tripoli in June. Great victory of Trafalgar obtained by the British fleet under lord Nelson, consisting of 40 ships of the line, over the combined French and Spanish fleets, consisting of 46 ships of the line, Oct. 21. In this battle the British admiral was killed, and the combined fleets lost 19 sail of the line. The great battle of Austrelitz same year, ... 1805

77. A law passed by the British parliament for the abolition of the slave trade. A total eclipse of the sun in the eastern part of the United States, June 18. A treaty signed at Paris between France on the one hand, and Bavaria, Wurtemberg, Baden, and several smaller states on the other: by which the latter under the name of the confederation of the Rhine, place themselves under the protection of France, ... 1806

78. Burr's conspiracy communicated to congress by the president of the United States, Jan. 28. The French and Spaniards invade Portugal. Revolution in South America commences. Law imposing a general and indefinite embargo passed by the congress of the United States, Dec. 22, ... 1807

79. The first steam boat in practical utility, invented by Robert Fulton. James Madison chosen the fourth president of the United States. The papal government

Rome subverted by the French. The British acts of Parliament restricting the trade of neutral nations, passed March 28th. Dreadful insurrection at Madrid, wherein upwards of 4000 French soldiers are massacred, and 300 Spaniards are murdered by the French, 1808

80. Joseph Bonaparte made king of Spain by his brother. A revolution takes place in Sweden, when Gustavus IV. is deposed and his uncle placed on the throne, March 13. The French defeat the Austrians in the battles of Abensburg, Ratisbon, and Eckmuhl, April 20, and 23, and take possession of Vienna, May 13, . 1808

81. The battle of Aspern or Esling, between the French and Austrians, in which the latter had 20,602 killed and wounded, May 21 and 22. The Austrians are again defeated at the battle of Wagram July 5 and 6. The embargo law repealed, and the non-intercourse established March 15. Arrangements are made with Mr. Erskine, by which a partial intercourse is opened with Great Britain, April 19, ... 1809

82. Peace between Russia and Austria ratified, Oct. 5. Bonaparte divorces his wife, the empress Josephine, Dec. 16, and marries the princess Maria Louisa, daughter of the emperor of Austria. Gaudaloupe taken by the British, March 5. Francis James Jackson, the British minister, arrives in America and disavows the arrangement made by Mr. Erskine. Mr. Jackson is dismissed by the president, and retires to New York, . 1809

83. Mr. Jackson, the discarded British minister, sails for England. Great riots in London on the committal of Sir Francis Burdette to the Tower, April 9. The crown prince of Sweden, dies, April 29, and Bernadotte, a celebrated French general, is chosen as successor to the Swedish throne, Aug. 21, . . . 1810

84. Lucien Bonaparte abdicates the throne of Holland, and that country is annexed to France, July 9. The Isle of Bourbon surrenders to the British, July 8. Lucien Bonaparte and his family, taken on their passage from Rome

to America, by the Pomona frigate, and afterwards s
to England, ... 1

85. Non-intercourse with Great Britain establis
by congress, February 1st. Louisiana made a state,
admitted into the union. M. Serrurier, the French
bassador arrives in the United States, May 2. Batt
Barosa, in which the French are defeated by the Bri
under general Graham, March 5. Badajos surrender
the French, March 10. The French defeated by
Wellington, in the battle of Fuentes de Hono
May 5, ... 1

86. General Berresford defeats the French u
marshal Soult, in the battle of Alburea, May 16. M
shal Suchet takes Tarragona by assault, June 29,
makes himself master of Montserat, July 24. The F
logne flotilla defeated by the Naiad frigate, in pres
of Bonaparte. Preparation in France for the invasio
Russia, ... 1

87. The United States declare war against Great
tain, June 18, 1812, in the 36th year of their inde
dence. British orders in council revoked, June 23.
naparte makes proposals for peace with Great Brit
which are rejected: he sets out from Paris to take
command of the army against Russia, May 9. Gen
Hull erects the American standard in Upper Can
July 13. The United States brig Nautilus of 16 g
commanded by lieut. Crane, captured by an Eng
squadron, July 15, ... 1

88. Michilimacinac taken by the British, July
Mob in Baltimore, in which the brave general Lin
lost his life, and several others were severely woun
and left for dead, July 27 and 28. General Hull
Canada and retreated to Detroit, August 7, . 1

89. English sloop of war Alert of 20 guns, capt
by the American frigate Essex, August 13. Gen
Hull surrendered his army and the whole territory of
chigan to the British under general Brock, August
The English frigate Guerriere of 38 guns, captured by

Constitution of 44 guns, commanded by captain Hull, August 19: great hurricane at New Orleans, same day, ... 1812

90. The Algerines commenced hostilities against the United States, by the capture of the brig Edwin of Salem, August 22. Battle of Queenstown, in which the American army commanded by general Van Rensselaer of the New York militia, attacked the British, and killed general Brock, and drove them from their entrenchments, but were afterwards repulsed and taken prisoners, October 13. Capture of the British sloop of war Frolic of 18 guns, by the United States sloop of war Wasp, of 16 guns. In this engagement, the Frolic had 30 killed and 50 wounded, and the Wasp 5 killed and 5 wounded, Oct. 18, ... 1812

91. The British frigate Macedonian of 38 guns, captured by the frigate United States of 44 guns, commanded by captain Decatur, after an action of 30 minutes, in which the Macedonian had 30 killed and 48 wounded, and the United States 5 killed and 7 wounded, Oct. 25. United States brig Vixen of 14 guns, taken by the British, December 22. Richmond theatre took fire during the performance, and 85 persons perished in the flames; among whom were the governor of the state, and several other persons of distinction, December 26, . . 1812

92. The British frigate Java of 38 guns, captured by the United States frigate Constitution of 44 guns, commanded by capt. Bainbridge, after an action of fifty-five minutes, in which the Java had 69 killed and 101 wounded, and the Constitution 9 killed and 25 wounded, December 29, ... 1812

93. *Foreign.* Lord Wellington defeats the French under Marmont, near Salamanca in Spain, June 28, 1812. Great and sanguinary battle fought at Borodino, between the French and Russians, in which both sides claim the victory, Sept. 7. The Russians set fire to Moscow, their ancient capital, which they abandon: The French enter it on the 14th of September. It is evacuated, October 19,

when the French begin their disastrous retreat. Moscow re-occupied by the Russians, October 22. Bonaparte, after leaving his army at Smergony, November 25, arrives in Paris the 18th of December, ... 1812

94. *Domestic.* The United States Schooner Viper of 12 guns, taken by the British, January 17, 1813. Battle of Frenchtown on the river Raisin, where general Winchester, with 35 officers and 487 non-commissioned officers and privates, surrendered themselves prisoners of war to the British and Indians commanded by colonel Proctor, January 22. The Chesapeake declared in a state of blockade, February 5. Ogdensburg captured by the British, and all the public stores removed or destroyed, February 22, ... 1813

95. The British brig Peacock, of 18 guns, captured by the United States ship Hornet of 16 guns, captain Lawrence, after an action of 15 minutes. The Hornet lost but 1 man killed and 2 wounded. From the Peacock were taken 112 prisoners, of which 33 were wounded, and the killed, amongst whom was the captain, sunk with the vessel, Feb. 24. Mobile taken by general Wilkinson without resistance, April 15. York, the seat of government for Upper Canada, taken by the Americans under general Dearborn, in which attack general Pike was killed by the explosion of a magazine, April 27, . 1813

96. Havre de Grace, Fredericktown, and Georgetown, in Maryland, burnt by the British, May 3 and 6. Fort George and Fort Erie surrendered to the Americans, May 27. The British made a descent upon Sacket's harbour, and were compelled to re-embark with great loss, by the American militia, and a small body of regulars under the command of general Brown, of the New York militia, May 29, ... 1813

97. The United States frigate Chesapeake of 36 guns, commanded by captain Lawrence, captured by the British frigate Shannon of 38 guns, after a desperate and sanguinary conflict, in which captain Lawrence with about 40 men were killed and 104 wounded, June 1, 1813

98. Numerous skirmishes and combats between the Americans and English during the months of June and July. August 18, the battle of Antonio in Mexico, between the Royal and Patriot Spanish armies; the former consisting of 3000, and the latter of 1100 men, which terminated, after four hour's fighting, in a loss to the Royalists of 756 killed, and the total rout and dispersion of the Patriots. The Creek Indians after destroying those of their tribe friendly to the Americans, commence hostilities against the United States by their attack on fort Mims, which they took after a spirited resistance from the garrison, when about 400 men, women, and children, were massacred, August 30, ... 1813

99. The brig Boxer of 14 guns, captured by the United States brig Enterprise, commanded by lieutenant Burrows, after an action of 45 minutes, in which both commanders fell; the Boxer had 40 killed and 17 wounded, and the Enterprize but 2 killed and 17 wounded, Sept. 5. Battle on lake Erie, between the British squadron commanded by captain Barclay, and the United States squadron under command of captain Perry, which after a severe conflict of 3 hours and a half, terminated in the capture of the whole British force. In this battle the British had 41 killed and 94 wounded: the Americans 27 killed and 96 wounded: the British squadron carried 69 guns, and the American 54 guns, Sept. 10, . 1813

100. Battle of Moravian town, in Upper Canada, in which the Americans under general Harrison, defeat the British and Indians under general Proctor, and takes 600 prisoners, October 5. A party of British under major Powel, attacked at Missiquoi, by colonel Clark of the Vermont militia, with 102 riflemen, and the whole of the British, consisting of 101 men, are made prisoners, October 12. Battle of the Tallusatchc towns, in which 186 warriors of the Creek Indians are killed, and 84 made prisoners by the Georgia and Tennessee militia. The Americans lost but 5 killed and 41 wounded, November 3, ... 1813

101. Battle of Talledoga, in which general Jackson with 2000 Tennessee volunteers, attacks the Creek Indians, and defeats them with the loss of 300 warriors. American loss, 51 killed and 80 wounded, November 9. General Floyd with 950 Georgia militia, and 350 friendly Indians, attack 1500 hostile Creeks at the towns of Autossee and Tallassee, kill about 200, and burn the towns, containing about 400 houses. The Americans had 11 killed and 54 wounded, Nov. 29. The British and Indians surprise and take fort Niagara, put the garrison to the sword, massacre the women and children, and burnt the villages of Lewistown, Youngstown, Manchester, and Tuscarora, December 19, . 1813

102. *Foreign.* Treaty between Russia and Sweden for the purpose of securing reciprocally their possessions against France, March 3; treaty of concert and subsidies with Great Britain, same day. The Russians declare war against France, March 27. Battle of Lutrens, in which victory is claimed both by the French and allies. The loss is supposed to have been about 15,000 on each side. The allies are immediately after obliged to retreat and cross the Elbe, 1 and 2 of May; dreadful battles were fought between the French and allies, at, and near the village of Bantzen, when the loss was supposed to have been nearly 20,000 on each side, . . 1813

103. The French defeated with great slaughter, by the British and Spaniards, under lord Wellington, at Arganson, 21st of June, when the loss of the allies was estimated at 5000, and the French at 20,000 men. All the French artillery, military chests, 415 wagons, &c. were taken. The French army defeated by Blucher, with the loss of 15,000 men, and 100 pieces of cannon, August 25. Battle of Dresden, when the allies were repulsed, and Moreau mortally wounded, August 27, 1813

104. A French corps under general Vandamme which had passed the allies into Bohemia compelled to surrender, with 60 pieces of cannon, August 30. The battle of Dennevitz, in which the French under marshal Ney,

are defeated by Bernadotte, with the loss of about 20,000 men, and fifty pieces of cannon, Sept. 6, . 1813

105. Battle of Leipsic, when the Saxons and Westphalians deserted to the allies by regiments, in which the French were defeated with the loss of upwards of 60,000 men, and 250 pieces of cannon, 16, 17, and 18 of October. Bonaparte begins his retreat across the Elster in the night, by a single bridge, which was blown up by the allies with great destruction to the French army then crossing. Oct. 24, ... 1813

106. Bonaparte cuts his way through the Bavarians with the loss of several thousands, at Hanau, Oct. 30; Arrives in Paris, November 9, meets the legislative body on the 10th. Bonaparte issues a proclamation, calling on the French to repel invasions, and declares that he no longer contemplates retaining his conquests, December 30, ... 1813

107. *Domestic.* The Indians attack general Floyd in his encampment, 48 miles west of Chatahouchee, but are repulsed with great loss. The Americans had 22 killed and 157 wounded, Jan. 27, 1814. Leut. colonel Butler with 160 Americans, defeats 420 of the British, March 4. The Creek Indians attacked in their entrenchments by the militia under general Jackson, and after an action of five hours, in which he had 25 killed and 105 wounded, they were completely defeated with the loss of 750 warriors killed, and 250 women and children made prisoners, March 27, ... 1814

108. The United States frigate Essex of 32 guns, and 255 men, commanded by captain Porter, captured by the British frigate Phœbe of 36 guns, 320 men, and the Cherub sloop of war, of 28 guns, and 180 men, after a desperate resistance, March 28. The embargo and non-importation laws repealed, April 14. Blockade of the whole American coast, proclaimed by admiral Cochrane, April 25. British sloop of war l'Epervier of 18 guns, captured by the United States sloop of war Peacock, of 18 guns, captain Warrington commander, April 29. Cap-

ture of fort Oswego, by 1800 of the British, after a gallant resistance of two days, by 300 men, May 6, 1814

109. Lieutenant-colonel Pearson with 250 North Carolina militia, and 70 Indians, having crossed the banks of the Alabama, made 622 Indians prisoners, June 1st. The sloop of war Reindeer, of 18 guns, captured by the United States sloop of war Wasp, after an action of 19 minutes, June 28. Fort Erie with its garrison of 137 men, surrendered without resistance to major-general Brown, July 3d. Battle of Chippewa, in which general Brown defeats the British under general Riall, and forces him to retire to Fort George. The Americans had 60 killed, 229 wounded, and 19 missing; the British 148 killed, 320 wounded, and 46 missing, July 5, . 1814

110. The battle of Baltimore, in which 5000 British troops, led by general Ross, are repulsed by the Americans, chiefly militia, with a loss of 46 killed, including general Ross, and 292 wounded. The Americans had 40 killed, and 200 wounded, and 49 made prisoners, Sept. 3d.—Battle of Plattsburgh and capture of the British squadron on lake Champlain, Sept. 11. Fort Boyer, at Mobile point, attacked by the Hermes and Charon sloops of war, together with two brigs, and three tenders, supported by 320 of the artillery, and marines, and a large number of Indians, is defended by major Lawrence, with 158 men, who after three hour's fighting, compels them to retire with great slaughter, and the loss of the Hermes, blown up, Sept. 15, ... 1814

111. Sortie on Fort Erie, in which general Brown attacks the British camp, destroys their batteries, and makes 385 prisoners, with a loss of 75 killed, 216 wounded, and 216 missing, Sept. 17. Attack upon the American privateer general Armstrong, captain Reid, in the harbour of Fayal, by 16 British barges, manned with 400 men, from the Plantaganet 74, Rota frigate, and a sloop of war.—The privateer sustained the attack till 120 of the British were killed, and 130 wounded, when she was scuttled and

abandoned by the crew, with the loss of 2 killed and 7 wounded, Sept. 26, ... 1814

112. First ship of war propelled by steam, launched at New York, October 29. General Jackson enters Pensacola with 5000 American militia, November 7. The first, last, and final adjournment of the Hartford convention, December 15. The British having made a landing in Louisiana, are attacked by general Jackson, in their camp near New Orleans, December 23. Treaty of peace concluded at Ghent, between the United States and Great Britain, December 24. The British attack general Jackson in his entrenchments, and are repulsed with considerable loss, December 28, ... 1814

113. *Foreign.* Bonaparte leaves Paris, to oppose the allies, who had entered France, January 25. Dreadful, but indecisive battles between the French and the allies, near Brienna, from January 27 to 3d of February. Almost one continued scene of carnage between the French and the allies in the vicinity of Paris, from the 3d to the 19th of February. A splendid victory obtained over Bonaparte by the allies under Blucher, March 9. The battle of Tarbes, when the allies under Wellington defeat the French in all directions, March 20, 1814

114. Desperate engagements between the allies and the French, on the 28, 29, and 30th of March, in which the latter are defeated. The French solicit a capitulation, March 31st, which was granted by the emperor of Russia and the king of Prussia, April 11. Bonaparte resigns the throne of France and Italy, April 2d, and the French senate invite Louis XVIII. as the sovereign of the nation, April 6, ... 1814

115. Treaty between the allies and Bonaparte, by which he is allowed two million francs (equal to 400,000 dollars) annually, and his wife and other relations, two and a half millions, and to him and his family, the sovereignty of the island of Elba, April 11. A bloody battle fought at Toulouse, April 11, between Wellington and Soult, in which the latter was defeated with immense

loss. Preliminaries of peace between France and the allies, concluded at Paris, April 25, and on May 4 Louis XVIII re-enters his capital. Ferdinand VII re-enters Madrid as king of Spain, 13th of May, abolishes the Cortes, and forthwith restores the old despotism of that kingdom, ... 1814

116. *Domestic.* The British renew their attack upon general Jackson, but are repulsed, January 1, 1815. Grand battle of New Orleans, in which 12,000 British, commanded by Sir Edward M. Packenham, attack the American entrenchments, defended chiefly by militia under general Jackson, and are repulsed with the loss of the commander in chief, two generals, and 586 killed, 1516 wounded, and 552 prisoners. The American loss in these battles was but 13 killed, 39 wounded, and 19 missing, January 8, ... 1815

117. The United States frigate President of 44 guns, under command of captain Decatur, captured by an English squadron, consisting of three frigates and one razee, after silencing one of the frigates in a running fight of 3 hours and 30 minutes, and receiving several broadsides from the others. The President had 24 killed and 55 wounded, Jan 15. The British sloop of war Sylph, of 18 guns, wrecked at Southampton, Long Island, and 111 out of 117 of the crew perished, January 15, . 1815

118. The British evacuate Louisiana, leaving 80 of their wounded, and 14 pieces of cannon, Jan. 17, having suffered in the several battles since their landing, a loss of 4000 men. The sloop of war Favourite, captain Maude, arrives at New York, with the ratified treaty of peace, February 11, ... 1815

119. Fort Boyer, at Mobile point, with the garrison, consisting of 336 men, surrender by capitulation, to the combined naval and military forces, under admiral Cochrane and general Lambert, February 11. The treaty of Ghent, ratified by the United States, February 17. British sloops of war, Cyane and Levant, captured by the

United States frigate Constitution, commanded by captain Stewart, after an action of 40 minutes, in which the British had 35 killed and 42 wounded, and the Americans 3 killed and 12 wounded, February 20, 1815

120. British schooner St. Lawrence, of 14 guns, captured after an action of 15 minutes by the American privateer Chasseur, of 16 guns, captain Boyle. The St. Lawrence had 15 killed and 25 wounded, and the Chasseur 5 killed and 8 wounded, Jan. 26. War declared against Algiers, March 3. British brig Penguin, of 18 guns, captured by the United States sloop of war Hornet, of 18 guns, commanded by captain Biddle, after an action of 22 minutes, in which the Penguin had her commander, and 13 men killed, and 28 wounded, and the Hornet but 1 killed, and 11 wounded, March 23, 1815

121. American prisoners confined at Dartmore in England, were inhumanly fired upon by the guard, by which a number of them were killed and wounded, April 6. The Misoda, Algerine frigate, of 46 guns, captured by the United States frigate Guerriere, of 44 guns, commodore Decatur, after a running fight of 25 minutes, in which the Algerines had 30 killed, and the Americans, 4 wounded, Jan. 17, ... 1814

122. An Algerine brig of 11 guns, chased on shore on the coast of Spain, by the squadron under commodore Decatur, and detained by the Spaniards, June 19. Treaty of peace concluded with the Algerines, June 30, 1815

123. *Foreign.* Bonaparte lands from Elba, at Frejus, with about 600 men, March 1, 1815, and proceeds to Paris, where he arrives March 20, having been joined on his way, by all those troops who were sent to oppose him. The Bourbons withdrew from Paris, March 19th. Towards the end of March, the British, Prussians, Dutch and Hanoverians, to the amount of upwards of 60,000 men, are stationed on the frontiers of Belgium, 1815

124. Treaty of alliance, offensive and defensive, between Russia, Austria, Prussia, and Great Britain, by which they agree to have in the field, 150,000 men each,

and is admitted into the union as a state, the session following. The Dey of Algiers, becoming dissatisfied with the treaty concluded by commodore Decatur, commodore Chauncey proceeds with his squadron to Algiers, and enters into a new treaty, on the 25th of December, 1816

134. Bank of the United States goes into operation January 1, 1817. Mississippi reports a constitution, August 15, and is admitted into the union the next session. James Monroe, the fifth president of the United States, takes the oath prescribed by the constitution, and enters upon the duties of his office, March 4th, . 1817

135. The great canal in the state of New York, opening a communication between the northern lakes and the Hudson river, commenced, July 4th, same year, 1817

136. Illinois reports a state constitution, August 26th, and is admitted into the union, December following, 1818

Alabama made a state, and admitted into the union the same year.

137. An unusual state of peace and tranquillity throughout the world, ... 1819

State of Maine admitted into the union, the same year.

Florida ceded to the United States by Spain, October 14th, ... 1820

138. Napoleon Bonaparte, late emperor of France, dies in captivity on the Island of St. Helena, May 5th, 1821. About 1500 houses, occupied by seven thousand muslin weavers, destroyed by an accidental fire at Zurat, in the East Indies, July 17, ... 1821

139. A great earthquake at Aleppo, by which about 20,000 persons lost their lives, August 13th, 1821

140. An important naval victory, obtained over the Turks by the Greeks, Nov. 25, . . . 1821

141. A dreadful massacre of the Greek inhabitants of the Island of Scio, by the Turks, May 11th, . 1822

142. Great fire at Canton, which destroyed about 10,000 houses, with various other kinds of property, to a vast amount, Nov. 21, ... 1822

143. Spain having abolished the Inquisition and con-

fiscated a large portion of the ecclesiastical possessions, and instituted a more liberal system of government, is invaded by French troops, to restore the ancient dynasty of religious despotism. In consequence of which, she declares war against France, April 23, . . 1823

DEFINITIONS.

ALGEBRA, a peculiar kind of arithmetic, in which the letters of the alphabet are employed in making the calculations. In algebra, the quantity sought, is taken, as if it were given; and by means of one or more quantities given, we proceed by a train of deductions, till the quantity at first only supposed to be known, or at least some power of it, is found to be equal to some quantity or quantities which are known; and by means of this process we find the true quantity sought.

2. *Anatomy* is the art of examining animal bodies, by dissection. It teaches the structure and functions of these bodies, and shows nearly on what life and health depend. When these are well understood, a great step is made towards the knowledge and cure of diseases.

3. *Acoustics*, the science which instructs us in the nature of sound. It is found by experiments, that sound travels at the rate of 1142 feet in a second, if no obstacles oppose its progress.

4. *Atmosphere* is that invisible elastic fluid which surrounds the earth at an unknown height, and encloses it on all sides. It is essential to the existence of animal and vegetable life. Nature herself, and the constitution and principles of matter, would be totally changed, if this fluid were wanting.

5. The atmosphere may be considered as one of the vast laboratories of nature, in which the chaos of animal, mineral, and vegetable effluvia undergoes various chemical

operations, by the influence of the sun, and the electric fluid.

6. *Allegory*, in matters of literature, a mode or species of writing, wherein something else is signified than the words in their literal meaning express. An allegory may be considered as a chain of metaphors, continued through the whole of a discourse.

7. *Antithesis*, in rhetoric, a contrast drawn between two things, which thereby serve as shades to set off the opposite qualities of each other.

8. *Ambiguity*, in literary composition, an expression of doubtful meaning, arising not from the use of equivocal terms, but solely from the injudicious construction of the phrase or sentence.

9. *Aurora Borealis*, in physiology, the northern dawn or light, sometimes called streamers, is an extraordinary meteor, or luminous appearance, showing itself in the night time in the northern part of the heavens. It is almost constantly to be seen during the long nights of the polar regions.

10. *Aërostation*, the art of navigation through the air. Hence all the machines which are employed for this purpose are called aerostates, or aerostatic machines, and on account of their round figures, air balloons.

11. *Biography*, a species of history, which records the lives of remarkable persons. It may be considered as a very interesting study, inasmuch as it represents great men more distinctly, and descends into the details of their actions and characters, their virtues, and their feelings, and gives us a more interesting picture of their conduct than general history allows.

12. *Belles-lettres*, pronounced Belle-lettres, are generally considered synonymous with polite literature: they include the origin and structure of the various kinds of languages; of grammar, criticism, history in its several departments, and all the different kinds of poetry.

13. *Barometer*, an instrument for measuring the weight or pressure of the atmosphere; and by that means the

variations in the state of the air, foretelling the changes in the weather, and for measuring heights, depths, &c.

14. *Basso-relievo*, or Bass-relief, a piece of sculpture, where the figures or images do not protuberate, or stand out far above the plane on which they are formed. Whatever figures or representations are thus cut, stamped, or otherwise wrought so that not the entire body, but only a part of it is raised above the plane, are said to be done in relief or relievo.

15. *Caloric*, is that peculiar element or property in nature which in proportion as it pervades or occupies bodies, constitutes their heat or temperature. A certain portion of caloric, will change hard bodies into dense fluids; and a still greater portion will convert these fluids into air or gas.

16. *Climax*, signifies the height to which a speaker rises by regular gradations from one circumstance to another till the idea is carried to the highest elevation.

17. *Conic sections*, are such curved lines, as are produced by the mutual intersection of a plane, and the surface of a solid cone. The nature and properties of these figures form a considerable part of the science of geometry.

18. *Corollary*, signifies some obvious consequence drawn from something already advanced or demonstrated; thus it being demonstrated that a triangle which has two equal sides, has also two angles equal; this corollary will follow, that a triangle with three sides equal, has also its three angles equal.

19. *Criticism*. Criticism is the art of investigating the merits or demerits of the productions of another. It is very extensive in its application, but in a more restricted meaning it implies an examination of literary compositions, and of the several branches of the fine arts. Whoever wishes to exercise the duties of criticism with propriety, should possess candour, taste, judgment, and general knowledge.

20. *Cosmography*, a description of the several parts of

the visible world, or the art of delineating the several bodies, according to their magnitude, motions and relations they bear to one another: or in other words, the science of the formation of the universe, embracing the sciences of geography and astronomy.

21. *Cornucopia*, or horn of plenty, among painters, &c. is represented under the figure of a large horn, out of which issue fruits and flowers. Upon ancient medals, the cornucopia was given to deities and heroes, to mark the facility and abundance of the wealth procured by the goodness of the former, or the ease and valour of the latter.

22. *Corals*, in natural history, are marine substances produced by insects; they grow in such quantities, and to such heights in some seas as to form large islands, inhabited by human beings. Many of the islands in the pacific ocean, have been raised by corals from the depth of the sea. Ships are sometimes lost on coral rocks.

23. *Conchology*, a branch of natural history which relates to shell-fish; though not generally useful in human economy, yet, perhaps, by the beauties of the subjects it treats of, it is calculated to lead to the contemplation of the glory of the Divinity in their creation.

24. *Convention*, in politics, an assembly of delegates from different parts of the country convened for the purpose of adopting some national or state regulation.

25. *Covenant*, in matters of law, an agreement or consent of two or more persons by deed or writing.

26. *Data*, amongst mathematicians, a term for such things or quantities as are given or known, in order to find other things that are unknown. From the primary use of the word data in the mathematics, it has been transplanted into other arts, where it expresses any quantity which, for the sake of present calculation, is assumed as true without stopping to give a proof of it.

27. *Definition* signifies the explanation of the signification of a word or determining the nature of any thing by

words, which serve as limits or boundaries to distinguish them from other things. A definition is nominal when it explains one word by another, and real when it explains the nature of a thing.

28. *Desideratum*, is used to signify the desirable perfections in any art or science: thus it is a desideratum with the blacksmith, to render his iron fusible with a gentle heat, and yet preserve it hard enough for ordinary uses.

29. *Demonstration*, a proof or chain of arguments founded on self-evident or admitted principles. It may be either mathematical, mechanical, or logical.

30. *Dietetics*, the science or philosophy of diets: that which teaches us to adapt particular food to particular organs of digestion, or to particular states of the same organs.

31. *Dioptrics*, the science of refractive vision, or that part of optics which considers the different refractions of light in its passage through the different mediums, as water, glass, &c.

32. *Ductility*, in physics, a property of certain bodies, whereby they are capable of being expanded or stretched by means of hammering or pressing. The great ductility of some bodies, especially gold, is very surprising; since a single grain of it may be stretched under the hammer into a leaf that will cover many square inches.

33. *Electricity*, is that peculiar fluid in nature, of which all bodies are capable of receiving. In the operations of nature, it is only exhibited to our view in what we call lightning; the presence of the electric fluid, can however be exhibited by artificial means, or rubbing a conducting body against a non-conductor, such for example, as the hand or a leather cushion against a cylinder of glass.

34. A body in an electric state attracts other bodies, and these become electric by touching it, and are afterwards repulsed. Bodies are capable of being electrified more or less strongly; and when the electric state is con-

siderably strong, the electrified body will throw out luminous sparks or flashes, to other bodies brought near it, and by that means communicate the same electric state to them, though not in actual contact.

35. *Earthquake.* An earthquake is an awful phenomenon; and the dreadful consequences attending sudden and violent convulsions of the earth, are sufficient reasons for attempting to account for their causes, but, from their nature it is utterly impossible to ascertain them accurately; rational conjecture must be accepted in the place of actual observation.

36. Every writer on the effects of volcanic eruptions, concur in attributing earthquakes to their internal operations, which become less frequent in their neighbourhood after volcanic eruptions through the craters: indeed it must be obvious on the first thought, that the furious effects of fire, hot air and steam, combined with electric matter, cannot but produce convulsive motions in the substances which confine them, and of more or less extent of violence, in proportion to the cause.

37. *Ethics*, the science of moral duties; it traces from man's nature and condition, the consequences of his actions; or in other words, it points the road he should pursue, in order to become virtuous and happy.

38. *Economy*, in politics, or political economy, is the science which treats of the wealth of nations. Its object is to ascertain in the first place, wherein wealth exists, and then to explain the causes of its production, and the principles on which it is distributed through the different orders of society.

39. *Entomology* is that branch of natural history, which treats of insects. The study of insects has sometimes been ridiculed as unworthy the attention of men of science; for this, however, there is no just reason; though inferior in point of magnitude, yet they surpass, in variety of structure, and singularity of appearance, all the larger branches of the animal world.

40. No one can examine with an attentive eye, the

subjects of this branch of science without surprise; the great variety of forms, the nice adaptation of their parts to the situation in which each happen to be placed, may excite the amazement of the curious and intelligent mind.

41. The same power and wisdom which are manifested in the order, harmony, and beauty of the heavenly bodies, are equally shown in the formation of the minutest insect; each has received that mechanism of body, those peculiar instincts, and is made to undergo those different changes, which fit it for its destined situation.

42. *Fencing* is the art of attacking an adversary with the sword, and defending the person from his thrusts. It is practised with small thin swords, or foils, which being blunted at the points, prevent accidental wounds. The gladiators, who were obliged to sacrifice their lives for the amusement of the Romans, received instructions in the use of the sword in order to lengthen the diversion of their cruel masters.

43. *Fermentation.* The word fermentation, in general is used to denote that change in the principles of organic bodies which begin to take place spontaneously, as soon as their vital functions have ceased, by which they are decomposed, or reduced to first principles.

44. *Finances*, in political economy, denote the revenues arising from taxation, duties, &c. received into the national treasury, and to be applied to national purposes, by government.

45. *Galaxy*, in astronomy, is a very remarkable appearance in the heavens; it is sometimes called the milky-way. This is a broad circle sometimes double, but for the most part, single, surrounding the celestial concave. We perceive, also, in different parts of the heavens, small white spots which appear to be of the same nature with the milky-way, consisting of an immense number of stars.

46. *Genealogy*, an enumeration of a series of ancestors; or a summary account of the relations and alliances of a person or family, both in the direct and collateral line.

47. *Genus*, in natural history, a sub-division of any class or order of natural beings, whether of the animal, vegetable, or mineral kingdoms, all agreeing in certain common characters.

48. *Geology*. Geology has for its object, the structure and formation of the globe; it, of course, embraces the consideration of the materials of which it is composed, and the circumstances peculiar to its original formation, as well as the different states under which it has existed, and the various changes which it has undergone.

49. *Gravity*, or gravitation, a term used by physical writers, to denote the cause by which all bodies move towards each other, unless prevented by some other force or obstacle.

50. *Gymnastics*, the athletic sports of youth, among the ancients; practised not only for amusement, but also to render the body more robust and healthful, and to enable the muscles to do their offices with greater effect.

51. The variety of methods contrived for this purpose, were very numerous, and the ardour with which they were pursued, at every opportunity, contributed to banish all dread of personal danger, and prepared the youth of each nation for a military life.

52. Amongst the great number of sports, pedestrian races were much practised by the Greeks, as illustrated by Homer:

Ranged in a line, the ready racers stand;
Pelides points the barrier with his hand;
All start at once; Oileus led the race,
The next Ulysses, measuring pace with pace;
Behind him, diligently close, he sped;—
As closely following as the running thread,
The spindle follows, and displays the charms
Of the fair spinster's breast, and moving arms.

53. Graceful in motion thus, his foe he plies,
And treads each footstep ere the dust can rise;
His glowing breath upon his shoulder plays;
The admiring Greeks, loud acclamations raise;
To him they give their wishes, hearts, and eyes,
And send their souls before him as he flies.

54. *Halos*, in meteorology, are circles that sometimes appear around the sun and moon, variously coloured, somewhat resembling the rainbow. They never appear in a rainy atmosphere, but generally in frosty weather.

55. *Heraldry*, the business of proclaiming important news, such as peace and war, by certain officers, called heralds. It was formerly the duty of heralds, to exhibit the coats of arms of the states to which they belonged.

56. *Hieroglyphics*, in antiquity, are mystical characters, or symbols, in use among the Egyptians, and other nations, both in their writings and inscriptions. Being the figures of various animals, parts of the human body, and of mechanical instruments.

57. *Hierarchy* is that kind of political government by which a nation is ruled by the church or ecclesiastical order. Wherever this kind of government has exclusively prevailed, the most awful consequences of fanaticism and persecution have been felt.

58. *Hyperbole*, in rhetoric, a figure of speech, in which the truth and reality of things are extravagantly magnified, or diminished.

59. *Horology*, is that branch of science which enables us to measure the proportions of time calculated from the succession of sensible events. The term horology, is at present more particularly confined to the principles upon which the art of making clocks and watches is established.

60. *Hydraulics*. Hydraulics teach us how to ascertain the velocity and power of fluids, when in motion, and serve as the basis for constructing those machines which are acted upon by running water; and show how to convey water by artificial means.

61. *Hydrostatics*. Hydrostatics relate to the equilibrium or weighing of non-elastic fluids, and show the pressure of solid bodies immersed therein. The comparative weights of fluids are ascertained by means of an instrument called the hydrometer.

62. *Immutability*, one of the divine attributes, founded on the absolute perfection of Deity. The immutability of

God, is two fold, physical and moral. The first consists in this, that the Divine Spirit does not, nor possibly can, receive any alteration, and the moral immutability is founded on the perfection of his nature, whereby he always wills what is best.

63. *Identity*, denotes any particular thing, without reference to any thing else; and carries with its meaning the very essence and being of what we have an idea.

64. *Irony*, a manner of speaking quite contrary to what we mean; an indirect expression, frequently conveying reproach or ridicule.

65. *Irrigation*, the art of conveying water over levels or inclined planes, in such manner that the whole may receive the benefit of partial immersion.

66. *Judgment* is that faculty given to man to supply the want of clear and certain knowledge. Where that cannot be had, it consists in putting ideas together, or separating them from one another in the mind, when their certain agreement or disagreement is not prescribed, but presumed to be so, which is as the word imports, taken to be so before it certainly appears.

67. *Jubilee*, a time of public and solemn festivity among the ancient Hebrews. This was kept every fiftieth year. It began about the autumnal equinox, and was proclaimed by sound of trumpets, throughout all the country.

68. *Jehovah*, one of the Scripture names of God, signifying the being who is self-existent, and gives life to others, and who rules and governs the universe.

69. *Jurisprudence* is the science of law, or in other words, is that branch of moral philosophy which comprehends a knowledge of the civil and municipal regulations of a state.

70. *Kamsin*, the name of a hot southerly wind, common in some parts of Egypt. This wind is said to prevail fifty days; hence it is called "the fifty day's wind." Travellers who have experienced the effects of it, have described it as being poisonous. When it commences, the atmosphere assumes a singular appearance. The

sky, at other times, so clear in this climate, becomes dark and heavy: the sun loses its splendor, and appears of a violet colour, and the air filled with a dust, so fine and subtile, that it penetrates every pore.

71. *Knowledge* is defined by Mr. Locke, to be the perception of the connexion and agreement, or disagreement, and repugnancy of our ideas.

72. *Laboratory.* A laboratory may be considered as the work house of a chemist, where he keeps the different apparatus used in chemical operations, together with such bodies as are the subjects of his labours and experiments.

73. *Legacy.* Legacy signifies a bequest of a sum of money, or any personal effects of testation, and these are to be paid by his representative, after all the debts of the deceased are discharged.

74. *Longevity.* Longevity signifies the continuance of life beyond its ordinary period of duration. The term of human life does not often exceed eighty years, but it is well known, that instances occasionally occur, of persons living to the age of one hundred years.

75. *Magic.* Magic in its original sense, signified only a knowledge of the more sublime parts of philosophy, but as the magicians likewise professed astrology, divination, and sorcery, the term magic, or magi became odious, being used to signify an unlawful, diabolical kind of science, acquired by the assistance of the devil, and departed souls.

76. *Magnetism*, the power of attraction. The singular and mysterious properties of load-stone have long engaged the attention of the curious. The phenomenon of polar attraction, is exhibited by the magnetic needle, which points north and south, when balanced on a point or pivot.

77. *Manufactures.* Manufactures, may be defined as the arts by which natural productions are brought into the state or form in which they are consumed or used.

78. *Mathematics.* Mathematics originally signified any description of learning; but, at present, denotes that science which teaches, or contemplates whatever is capable of being numbered or measured.

79. *Mensuration*, is the art of ascertaining the contents, or superficial areas, or planes, of solids, or substantial objects, and the lengths, breadths, &c. of various figures, either abstractedly or collectively.

80. *Metaphor*, in rhetoric, a certain expression in which a comparison or simile is used, in order to enforce and illustrate the subject of which we speak. Metaphors, when properly used, have a peculiar effect in giving light and strength to description.

81. *Meteorology* is the science of studying the phenomena of the atmosphere, and the term by which is expressed all the observations which tend to make them a system.

82. *Mimosa*, in botany, the sensitive plant, which is thus characterized by Dr. Darwin.

> Weak with nice sense, the chaste Mimosa stands,
> From each rude touch withdraws her timid hands;
> Oft as light clouds o'erspread the summer glade,
> Alarm'd she trembles at the moving shade;
> And feels alive through all her tender form,
> The whisper'd murmurs of the gathering storm;
> Shuts her sweet eyelids to approaching night,
> And hails with freshen'd charms, the rising light.

83. *Mobility* is that property which all bodies have of being moveable, or capable of changing their places, or their situations. This property of matter, is evident to our senses.

84. *Monsoon*, in physiology, a species of trade wind, in some parts of the East Indies, which for six months blows constantly the same way, and the contrary way the other six months.

85. *Nebula*, in astronomy, are spots in the heavens; some of which consist of clusters of telescopic stars, others appear as luminous spots of different forms.

86. *Nomenclature*, a catalogue of some of the most useful words in any language, with their significations, compiled in order to facilitate the use of such words, to those who are to learn the tongue.

86. *Observatory*, a place from which observations of the heavenly bodies are made; it is a building usually in the form of a tower, erected on an eminence, and covered with a terrace.

87. *Optics*, the science of vision and perspectives, as also the doctrine of light and colours, and all the phenomena of visible objects. In its most extensive acceptation, it is a mixed mathematical science, which explains the manner in which vision is performed in the eye, and treats of sight in general.

88. *Oratorio*, in music, a species of musical drama, originally an imitation of the serious opera; the subject of which is generally taken from scripture, and can only be treated properly by music of the sublimest style.

89. *Oryctology* is the science which teaches the natural history of those animal and vegetable substances which are dug out of the earth in a mineralized state.

90. *Perspicuity*, in rhetoric, a clear and intelligible expression, perfectly consistent with what nature and reason would dictate; such as is well understood both by the speaker and hearer.

91. *Perception*, is a primary faculty of the mind, it consists in the attention of the understanding to the objects acting upon it, whereby it becomes sensible of the impressions they make; and the notices of these impressions, as they exist in the mind, are distinguished by the name of ideas.

92. *Paradox*. Paradox in philosophy, is a proposition seemingly absurd, as being contrary to some generally received opinion; but perfectly true, agreeable to logical and mathematical demonstration.

93. *Personification*, signifies a figure in composition by which we attribute life, and the use of reason to inanimate objects, and represent them in the characters of rational beings.

94. *Pharmacy*. Pharmacy is the art of mixing, and compounding, and preparing medicines; in doing which,

a variety of operations are necessary, some of them mechanical, and some chemical; the use of this art belongs to the apothecary.

95. *Philology*, is that kind of learning which comprehends a knowledge of the grammar of a language; embracing the derivation of words and the analogies of the different parts of speech, together with the rules for grammatical criticism.

96. *Physiology*. Physiology is the science which treats of the powers that actuate the component parts of living bodies, and the functions which these bodies execute. It pre-supposes, therefore, a knowledge of the structure of the body, which is the subject of anatomy; the latter may be called the science of organization, while physiology is the science of life.

97. *Pneumatics* is that branch of natural philosophy which treats of the weight, pressure, and elasticity of the air, and the effects arising from them.

98. *Preliminary*, in general, denotes something to be examined and determined, before an affair can be treated of to the purpose. The preliminaries of peace consist chiefly in settling the powers of the ambassadors, and certain points in dispute, which must be determined previous to the treaty itself.

99. *Prosody*. Prosody is that part of grammar which teaches the true pronunciation of words; comprehending accent, quantity, emphasis, pauses, tones, and the laws of versification.

100. *Punctuation*. Punctuation is that art by which we are taught the method of dividing a written composition into sentences, or parts of sentences, by means of certain characters, denominated points, or stops, which serve to mark the different pauses which the sense requires in reading.

101. *Quintessence*, properly the fifth essence, or the result of five successive distillations. The term is, however, nearly obsolete, but was formerly used to express

the highest degree of rectification to which any substance could be brought.

102. *Quadrupeds*, in zoology, a class of land animals, with hairy bodies, and four limbs or legs; and to this, that the females bring forth their young alive, and nourish them with their milk.

103. *Rainbow.* The rainbow is a circular image of the sun, variously coloured; it is produced by the solar rays entering the drops of the falling rain, which are refracted to their farther surfaces, and then, by one or more refractions, transmitted to the eye.

104. *Reflection*, is the mind's perception of its own faculties and operations. It is by reflection that we acquire the ideas of thinking, doubting, believing, &c. which are the different operations represented to us by our consciousness.

105. *Reproduction*, is usually understood to mean the restoration of a thing before existing, and since destroyed. It is very well known that trees and plants of certain kinds, can be reproduced from the slips and fragments of those that have been destroyed.

106. *Refraction*, in its most general meaning, signifies the deviation of a moving body from its direct course, occasioned by the different density of the medium it moves in: or, it is a change of direction by a body's falling obliquely out of the one medium into another of different density.

107. *Saturation* is a term used in chemistry, to denote the limits of the proportions in which bodies combine together, beyond which they cannot pass; these are called the points of saturation; thus, salt dissolves in water; but the water combines only with a certain proportion, and whatever quantity of salt is added beyond this proportion, it falls to the bottom, undissolved.

108. *Sensation* is the source of our original ideas, and comprehends the notice conveyed into the mind by the impulse or impressions made upon the organs of sense by colours, sounds, tastes, touch and smell. We therefore derive all our numerous ideas from external objects.

109. *Sculpture*, the art of forming different figures from stone. Sculpture and carving are sometimes considered as conveying the same import; but the difference is, that one is confined to stone, and the other to wood.

110. *Stenography*, or short hand writing, a compendious kind of writing; in which certain abbreviations and significant characters are used, in order that the writer may convey his meaning with greater expedition.

111. *Statistics*, a modern term, adopted to express a more comprehensive view of the various particulars, constituting the natural and political strength of a country, than was usually embraced by writers on political arithmetic.

112. Its principal objects are the extent and population of a state; the occupations of its different classes of inhabitants; the progress of agriculture, of manufactures, and of internal and foreign trade; the income and wealth of the inhabitants, and the proportion drawn from them for the public service by taxation; the condition and state of the institutions of public utility.

113. *Statuary*, a branch of sculpture employed in making statues. Statuary was formerly more popular and more cultivated than at present. Phidias was the greatest statuary among the ancients, and Michael Angelo among the moderns.

114. *Sophestry*, a false but imposing kind of reasoning, founded on ambiguous terms and falacious premises. It has ever been the source of much evil to society; and that kind of logic calculated to defeat its purposes should be cultivated as an important art.

115. *Surgery* is that division of the healing art which is chiefly conversant with the treatment of the external and local disorders of the body, of the effects of accidental injury, and such diseases in general, as are curable by manual operations.

116. *Tactics*. Tactics in their general acceptation, relate to those evolutions, manœuvres, and positions, which

constitute the main spring of military finesse. They are the means whereby discipline is made to support the operations of a campaign, and are in every regular service studied, for the purpose of training all the component parts according to one regular plan or system; whereby celerity, precision, and strength, are combined, and the whole rendered more efficient.

117. *Tenacity*, a term applied to metals, by which is meant the power a metallic wire, of a given diameter, has of resisting, without breaking, the action or power of a weight suspended from its extremity.

118. *Theorem*, a speculative proposition, demonstrating the properties of any subject. There are two kinds of theorems, general and particular; and these are sometimes distinguished into negative, local, plain, and solid.

119. *Tides*. Tides are two periodical motions of the sea, called the flux and reflux, or the flow and ebb. The cause of the tides is supposed to be the attraction of the sun and moon, but chiefly of the latter.

120. *Topography*. This term is applied to all those writings, which have for their subjects the description of tracts of country, as it regards their nature and appearance.

121. *Tornado*, a sudden and vehement gust of wind. A tornado frequently resembles a whirlwind, but it is more violent in its effects. The power and impetuosity of a tornado is best known by those who have witnessed its desolating progress, in displacing every moveable substance in its course.

122. *Trope*, in rhetoric, a kind of figure of speech, whereby a word is removed from its first and natural signification, and applied with advantage to another thing which it does not originally mean, but only stands for it, as it has relation or connexion with it, as in this sentence, *God is my rock*. Here the trope lies in the word rock, which, firm and immoveable, excites in our minds the notion of God's unfailing and steady support which good men receive from their dependence upon him.

123. *Trigonometry.* The business of this important science is, to find the angles of a triangle when the sides are given; and the sides of their respective ratios when the angles are given; and to find sides and angles when sides and angles are partly given.

124. *Undulation*, in physics, a kind of tremulous motion, or vibration, observable in a liquid, whereby it alternately rises and falls like the waves of the sea. Thus, undulatous motion, if the liquid be smooth or at rest, is propagated in concentric circles, as most people have observed by throwing a stone or other substance upon the surface of stagnant water.

125. *University* is a term used to signify the establishment of several colleges in one particular situation, all of which are subject to the same general government, having professors in each branch of science.

126. *Usury.* Usury signifies a contract upon the loan of money, in which the borrower agrees to give the lender a certain profit, more than the lawfully established rate of interest. And agreeable to the common acceptation of this word, it seems that all undue advantages taken by a lender against a borrower, comes under the denomination of usury.

127. *Volcano.* A volcano is an awful and sublime phenomenon in nature, and may be defined as the eruption or explosion of fire generated in the bowels of the earth. The principal products of volcanic eruptions are lava, or mineral substance in a state of fusion, stones, ashes, flame, and smoke.

128. Many rational conjectures have been given in regard to volcanoes, but as those subterraneous fires are influenced by causes which it is impossible should ever be explained by actual observation, we only judge from what they exhibit in their external operations.

129. *Volition*, the act of willing or determining any thing by choice. The will appears to be nothing but a desire or aversion, sufficiently strong to produce an action.

130. *Words* are what constitute language, and may

be considered, first, as impressions upon the ear; secondly, as the actions of the organs of speech; thirdly, as impressions made upon the eye by characters; and fourthly, as the action in the hand in writing them.

131. *Weight*, in physics, a quality in natural bodies, by which they tend towards the centre of the earth. The weight of all bodies, at equal distances from the centre of the earth are proportional to the quantities of matter that each contains.

132. *Whirlwind*, a wind that rises suddenly, and is exceedingly rapid and impetuous, in a whirling, and also a progressive direction; but it is generally of short duration.

133. *Water spout*, an extraordinary operation in the atmosphere, most frequently observable at sea. It generally begins by a cloud, which appears very small; but which augments in a little time to an enormous cloud of a cylisoderical form, or that of cone upon its apex, and produces a noise like the roaring of an agitated sea; it is sometimes accompanied with thunder and lightning.

134. *Wreath*, signifies any thing curled or twisted, such as a garland or chaplet of flowers. In heraldry a badge of honour, consisting of silk or fine linen, with appropriate figures or devices painted thereon.

135. *Xenophon*, a Grecian philosopher of great celebrity, who died at Corinth, in the ninety-first year of his age, 359 years before Christ.

136. *Yeomanry*, those who are engaged in agricultural pursuits, such as independent farmers, or freeholders; in the United States a very numerous and respectable class of inhabitants.

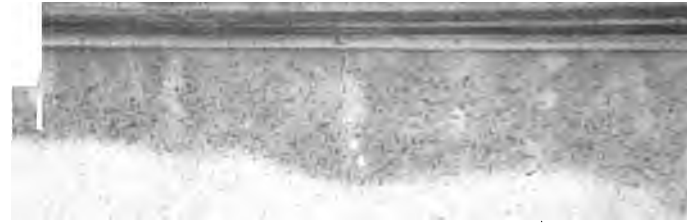
137. *Zoophytes*, in natural history, certain organized marine substances which hold a medium between animals and vegetables. Most of them take root and grow up into stems, multiplying life in their branches and deciducus buds, and in the transformation of their blossoms or polypus, which are endued with spontaneous motion.

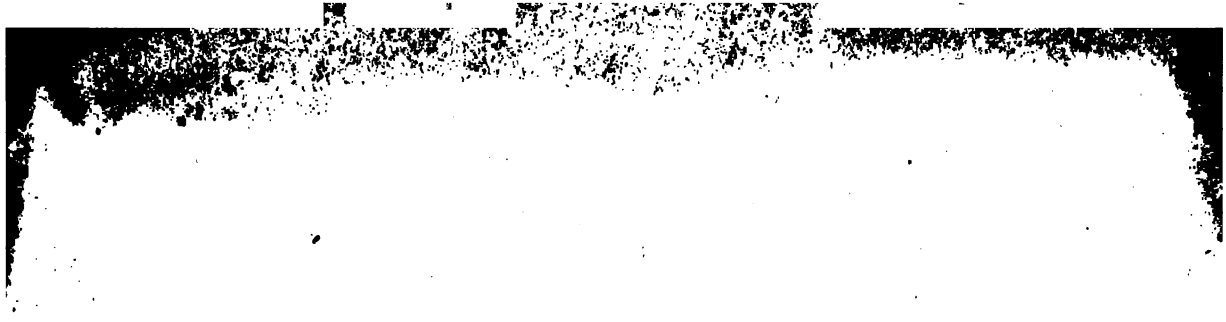
138. *Zeno*, in ancient biography, an eminent Grecian philosopher, who was born at Elea 504 years before Christ. He was a zealous friend of civil liberty, and is celebrated for his courageous and successful opposition to tyrants.

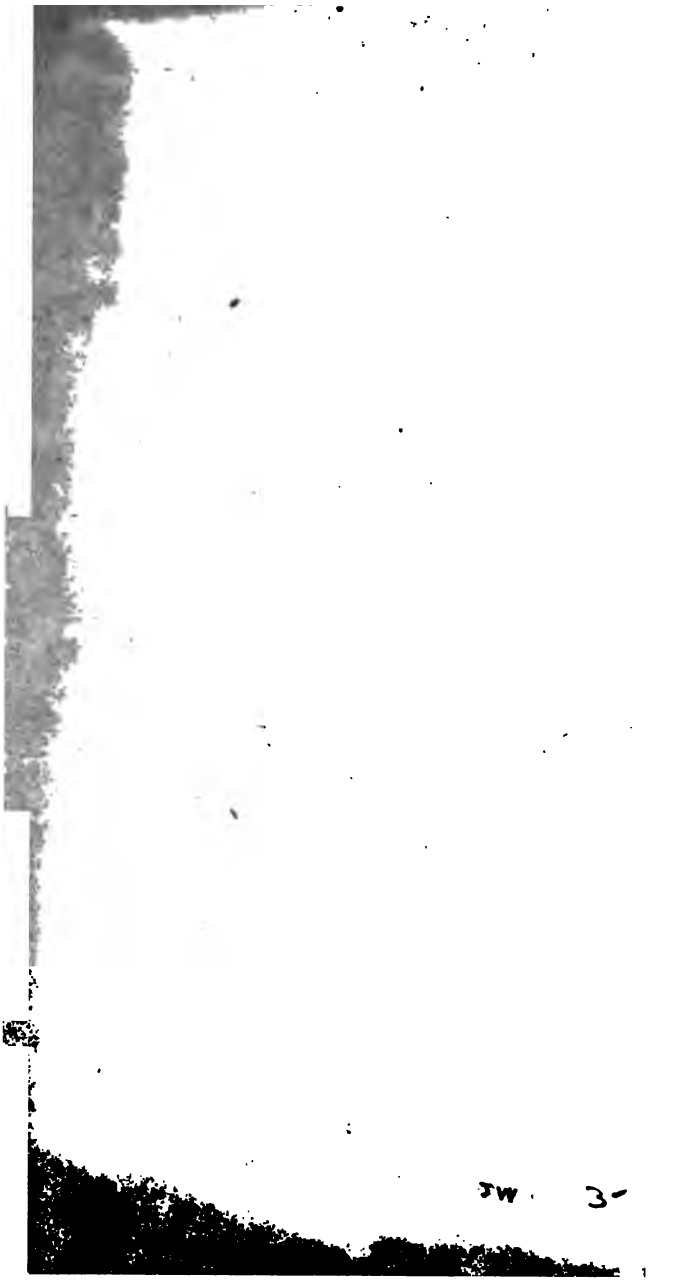
139. *Zenith*, in astronomy, the vertical point, or a point in the heavens directly over our heads. The zenith is exactly opposite to the nadir, which is a point directly under our feet.

140. *Zeal*, a warm and ardent passion, by which we are actuated in our endeavours to accomplish any desirable purpose. As it is very commendable when influenced by virtuous motives, we should always be zealous in doing good.

THE END.



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